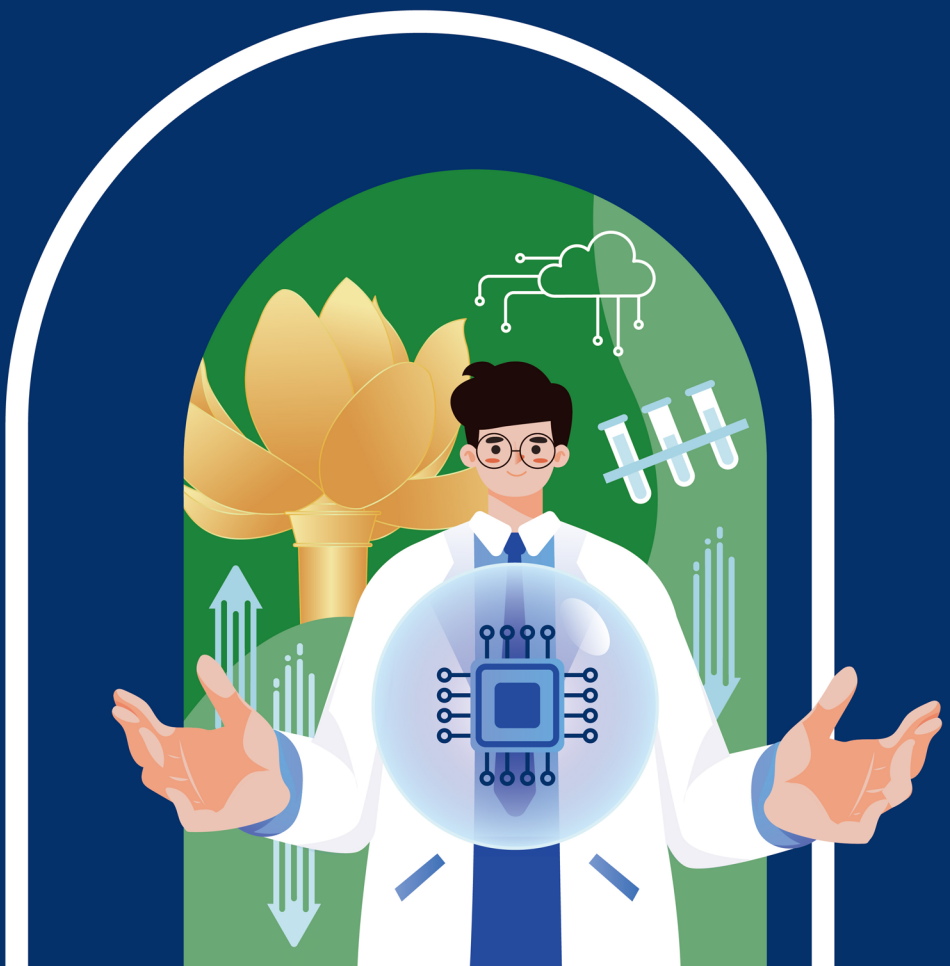
澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

UM RESEARCH | 澳大研究

Issue 3 第三期 2023



校長寄語
Rector's Message

值此澳門回歸祖國二十五年之際，我謹代表澳門大學全體師生表示熱烈祝賀。回顧這段時間所經歷的種種變遷，澳門在法制建設、產業多元、經濟民生、粵澳合作等方面得到了持續的發展，實現了社會的長期繁榮穩定。澳門大學作為澳門的一所國際化綜合性公立大學，積極響應中央及特區政府的殷切期望，致力於培養更多愛國愛澳人才，創造更多科研成果，支持澳門經濟適度多元可持續發展，全力配合國家的重大發展戰略以及特區政府的施政部署。

「回歸」是澳門歷史上的一個重要里程碑，不僅為澳門人民帶來了實實在在的福祉，也為澳門大學開創了新的歷史篇章。澳門大學近年來的飛速發展正是「一國兩制」成功實踐的生動寫照。在研究方面，澳大鼓勵研究人員採用跨學科方法協同創新，積極實踐產學研成果轉化，為社會發展做出貢獻。從澳門的法治體制建設，經濟產業多元的轉變，中醫藥的傳承發展，再到芯片電子及智慧城市的發展，以及大數據和語言研究推動社會人文進步，澳大在各個領域都取得了豐碩的成果。在本期雜誌中，您將了解更多澳大學者以澳門回歸的獨特視角分享前沿科學技術和研究背後的故事。

當前，澳門大學的國際聲譽持續攀升，在大灣區、國家和全球已成為一間具有影響力的大學。在新的時代背景下，澳門大學將緊密配合特區政府在高等教育和科技創新領域的施政部署和方向，始終面向國家和澳門所需，透過培養頂尖人才和實踐成果轉化，以服務社會為己任，充分發揮澳大所長，以「立足澳門，共建灣區，融入國家，走向世界」為發展定位，精準聚集特色學科，著力開展前沿研究。

在這個特殊的時刻，我衷心祝願祖國繁榮昌盛，澳門生機蓬勃，人民富裕安康！我亦感謝所有為澳門大學的科研成就和創新發展付出辛勞的研究人員。讓我們攜手並肩，共同為祖國和澳門的明天努力奮鬥！

On behalf of the faculty and students of the University of Macau (UM), I would like to express my warmest congratulations on the 25th anniversary of Macao's handover to China. Reflecting on the changes that Macao has experienced during this period, we are witnessing continuous development in the areas of Macao's legal system, industrial diversification, livelihood economy and cooperation between Guangdong and Macao. Macao's society has realised long-term prosperity and stability. As an international public comprehensive university in Macao, UM actively responds to the expectations of the central government and Macao Special Administrative Region (SAR) government. We are committed to nurturing talents who "Love the Country, Love Macao" and generating impactful research outputs to support Macao's appropriate economic diversification and sustainable development. Moreover, we align our efforts with the country's key development strategies as well as the policy initiatives of the SAR government.

The "Handover" marks an important milestone in Macao's history. It has not only brought tangible benefits to the residents but also opened a new chapter in the history of UM. The rapid development of UM in recent years vividly reflects the successful implementation of "One Country, Two Systems" policy. In terms of research, UM encourages interdisciplinary collaboration and innovation among researchers, actively facilitates the transfer of industry-university-research results, and strives to make meaningful contributions to society. UM has achieved substantial research breakthroughs in various fields, ranging from establishing the rule of law in Macao to promoting economic and industrial diversification, advancing Chinese medicine, developing electronics

and smart cities, and making progress in society through big data and language research. In this issue, we will delve into the inspiring stories and cutting-edge science and technology behind the research, offering a unique perspective on Macao's handover.

As its international reputation continues to grow, UM has evolved into an influential university in the Greater Bay Area, the country and even the world. In the context of a new era, UM will closely align itself with the policies and directions set forth by the Macao SAR government in the fields of higher education and technological innovation. It will also orient itself to meet the needs of the country and Macao. Leveraging its existing advantages, UM is committed to serving society by training outstanding talents and translating research outputs. The University positions itself as a university with firm roots in Macao, while at the same time being committed to participating in the development of the Greater Bay Area. It hopes to integrate itself into national development while reaching out to the world. Regarding research, UM will focus on its distinctive disciplines and specialised cutting-edge research.

At this special moment, I extend my heartfelt wishes for the prosperity of our motherland, the flourishing of Macao, and the well-being of its people. I would also like to express my gratitude to the researchers who have made valuable contributions to UM's research achievements and innovative development. Together, let us join hands and work towards a bright future for our country and Macao!

宋永華
Yonghua Song

TABLE OF CONTENTS

目錄

專題故事
慶祝澳門回歸25周年

Feature Story
Celebrating the 25th Anniversary of Macao's Handover

為「一國兩制」行穩致遠和澳門法治建設服務

Serving the Steady Implementation of "One Country, Two Systems" and the Building of the Rule of Law in Macao

文：黃蕾君、馬文華、趙怡瑋
Chinese & English Text: Lexie Huang, Martin Ma, Eva Zhao

圖：趙怡瑋、部分由受訪者提供
Photo: Eva Zhao, partially provided by the interviewee

2024 年是澳門回歸祖國 25 周年，也是《中華人民共和國澳門特別行政區基本法》(下稱「《基本法》」) 頒佈的 31 周年。澳門大學法學院是澳門歷史最悠久的法學院，在過去的 25 年裡，為培養本地法律人才、澳門法律本地化和法律普及等方面作出重要貢獻。粵港澳大灣區和橫琴粵澳深度合作區的建設為澳門的發展帶了新的歷史機遇。站在新的發展階段，法學院致力為「一國兩制」新實踐和澳門現代化法治建設作出更多貢獻。

The year 2024 marks the 25th anniversary of the Handover of Macao to China, as well as the 31st anniversary of the promulgation of the Basic Law of the Macao Special Administrative Region of the People's Republic of China (Basic Law). As the oldest law school in Macao, the Faculty of Law of UM has played a crucial role in the past 25 years. It has made significant contributions to the training of local legal talents, the localisation of Macao law and the promotion of legal awareness. The establishment of the Guangdong-Hong Kong-Macao Greater Bay Area and the Guangdong-Macao In-Depth Cooperation Zone in Hengqin has opened up new historical opportunities for Macao's development. Standing at a new stage of development, the Faculty of Law is committed to making further contributions to the new practice of "One Country, Two Systems" and the modernisation of the rule of law in Macao.

《基本法》是「一國兩制」的生命線

駱偉建教授
Professor Wai Kin Lok

2024年是澳門回歸祖國25周年，也是「一國兩制」方針和《基本法》在澳門成功實踐的第25年。在中央政府和澳門特區政府的領導下，在社會各界人士的協同努力下，澳門在過去的25年裡取得了長足的發展和矚目的成就，實現經濟躍升，社會穩定，文化交融。25年來，事實充分證明「一國兩制」是保持澳門社會長期繁榮穩定的關鍵。

《基本法》是「一國兩制」方針的法律保障和堅定基石。澳大法學院教授駱偉建形容《基本法》是「一國兩制」的「生命線」，他曾參與港澳兩部《基本法》的起草、研究和教學，與《基本法》有着深厚的淵源。他認為：「《基本法》的作用主要體現在三個方面。首先，它作為社會秩序的基本準則，保障了澳門社會的基本穩定。回歸前，澳門的治安問題十分嚴重，造成市民很大的心理恐慌。回歸後，在中央政府的支持和特區政府努力下，治安問題迅速得到解決，澳門現已成為全球最安全的城市之一。其次，《基本法》保障了澳門的經濟發展。回歸前，澳門經濟持續下行，整個社會對於回歸後的經濟是缺乏信心的。《基本法》的實施，令澳門得以有限度地開放旅遊和博彩業，對土地開發、對外貿易、金融貨幣等經濟制度亦提供了法律保障，澳門的經濟在回歸後實現飛躍式發展。第三，從國家層面來說，《基本法》的實施維護了國家的主權、保障了國家的安全，實現了國家長遠的發展利益。按照《基本法》的規定，澳門早在2009年就制定了《國家安全法》，這對於維護國家安全起到重要作用，一旦有危害國家安全的情況都可以及時制止。」

憲法與基本法研究：服務「一國兩制」行穩致遠

澳大在2018年設立憲法與基本法研究中心，並在2019年成為國家教育部人文社科重點研究基地——北京大學憲法與行政法研究中心的夥伴基地。該中心致力於普及憲法與基本法知識，增強憲法意識，推進「一國兩制」實踐在澳門行穩致遠。中心不僅向澳大學生講授關於《憲法》和《基本法》的通識必修科目，也與政府部門培訓宣傳《憲法》和《基本法》的人才，對象包括中小學教師。

自2018年，中心着手開展憲法與基本法教學系統化研究，獲得中央有關部門和特區政府的支持，國家教育部於2020年正式委託中心開展《澳門特區憲法與基本法普及教育系統化研究》。中心亦與澳門基本法推廣協會合作《憲法與基本法系統化教學在澳門高校開展可行性研究》和《憲法與基本法系統化教學在澳門中小學開展可行性研究》的研究課題。

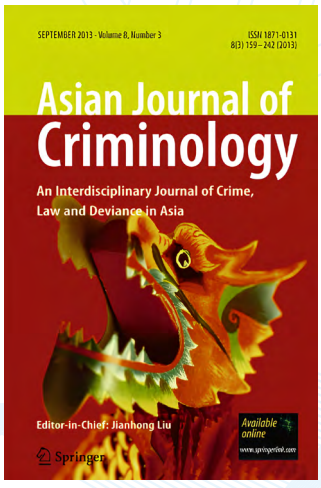
駱偉建教授指出：「澳門土地面積狹小，發展受到空間制約，橫琴與澳門一河之隔，有着更廣闊的發展空間。正是『一國兩制』的優勢令國家很容易支持澳門的發展，很快在橫琴劃出一片空間來支持澳大的建設，並且授權由澳門來管轄，適用澳門的法律。」澳大法學院院長、教授兼中國-葡語國家司法法律研究中心主任唐曉晴亦表示：「一國兩制是一個偉大的構想，在國家的支持下，我們才有了澳大的發展，這是我們親身經歷、親眼所見。我們要深入了解一國和兩制之間的關係，也要更主動地融入國家發展大局，這是我們面對未來應該有的態度。」

特色法律研究：服務本地，走向世界

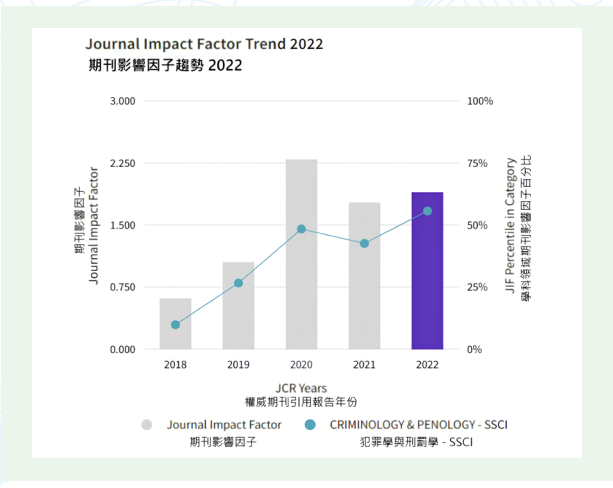
澳大法學院早在2005年就創辦綜合性法學學術期刊《澳門法學》，現已成為澳門地區最具權威性和影響力的綜合法學學術期刊，亦是北大法寶數據庫、中國知網CNKI海外版和國家哲學社會科學文獻中心收錄期刊、以及中國人民大學複印報刊資料轉載來源期刊。為積極促進粵澳法治機制交流與銜接，《澳門法學》自2021年9月開設《粵澳深合區法治研究》專欄，為推動粵澳深度合作區的法治建設提供研究平台。

除了專注於澳門地區的研究，澳大法學院的法學研究更跨越亞洲。法學院特聘教授劉建宏是亞洲犯罪學學科發展的權威領軍人物，由他主編的《亞洲犯罪學期刊》是亞洲地區首部收錄於《社會科學引文索引》（SSCI）的犯罪學學術期刊，該期刊致力於推動亞洲犯罪學和中國犯罪學的發展，它的跨學科方法涵蓋了一系列的研究領域，包括犯罪學、法學、刑事司法、社會學、心理學、法醫學、社會工作、城市研究、歷史學和地理學等。在劉教授的領導下，《亞洲犯罪學期刊》發展迅速，影響不斷擴大，在權威期刊引用報告（Journal Citation Reports，簡稱JCR）2022年的影響因數為1.9，同時在全球區域性犯罪學期刊中位列第三。過去數年亦在SCImago Journal Ranking及Scopus CiteScore™兩個權威期刊的法學期刊排名中都蟬聯法學類頂級10%，同時又挺進SSCI二區，成為世界上極少數在三個權威排名中都排名很高的期刊，在犯罪學領域得到廣泛認可，並進一步提升澳大法學研究的學術聲望。

《澳門法學》期刊
Macau Law Review Journal



《亞洲犯罪學期刊》
Asian Journal of Criminology



《亞洲犯罪學期刊》影響因子穩步上升
The Impact Factor of the *Asian Journal of Criminology* is steadily growing

中國—葡語國家司法法律研究中心合作協議簽署暨揭牌活動
Agreement Signing and Inauguration Ceremony of the Centre for Judicial and Legal Studies of China and Portuguese-Speaking Countries

澳門的法律制度與葡萄牙有着深厚的歷史淵源。在「一帶一路」倡議下，中國與葡語國家往來更加密切，彼此之間的司法合作需求不斷增大。為發揮澳門在中國與葡語國家間的橋樑紐帶作用，2023年9月，澳大法學院與最高人民法院共建中國—葡語國家司法法律研究中心。唐院長表示：「能夠與最高人民法院共建這個研究中心，對澳大來說是非常榮幸也非常有意義的事。中心的主要任務是增強與葡語國家法律和司法界的互動交流，在此基礎上，我們會建立中葡法律和案例資料庫，完善外國法查明機制。此外，法學院還將發揮澳大中葡雙語法律人才的優勢，與葡語國家深入開展葡語法律研究。」

作為精通中英葡三語的法律人才，唐教授對羅馬法亦有所涉獵。他說：「法學院的很多教研人員都精通雙語或多語，憑藉語言的優勢，我們一直在向全世界展示我們的法律研究。我們不僅研究國際法、歐盟法、比較法，也向全世界展示中國的法治發展，推動中國法律研究的國際化。」

培養國家和澳門所需的法律人才

澳大法學院自成立之時就肩負着培養本地法律人才的使命。澳門絕大多數的法律專才，包括法官、檢察官、律師和政府內的法律人員，都是澳大的畢業生。法學院不僅開設了分別用中、葡文教學以及中葡雙語授課的法學士課程，還有分別用中、葡、英文教學的法學碩士及學士後證書課程和法學博士課程。2023/2024學年，法學院新開設以英語授課的「中國法與環球法學」法學士課程，為學生提供獨特的學習機會，既可以涉獵中國傳統法律教育中的主要法律主題，也可以學習管理世界國際關係的全球化國際法律秩序的主要課程。唐教授說：「該課程的開設旨在培養具全球競爭力和世界擔當的國際化雙語法律人才，在2023年推出之後不僅吸引很多本地和內地生的關注，亦有不少國際生希望通過參加此課程學習中國法，報名人數超過一千人。」

唐曉晴教授
Professor Io Cheng Tong

在師資方面，法學院亦有其特色。學院定期邀請國際著名法律學者擔任訪問教授，以及聘請部分澳門現任法官、檢察官、律師和政府部門的法律專家為兼職教員，不僅增強學生的國際視野，亦提供法律實務的經驗。唐教授還介紹到：「法學院近年在國際高端法律人才的引進亦有所突破。法學院講座教授兼人文社科高等研究院院長於興中是國際知名的法理學家，他在哈佛大學獲得法學碩士和法學博士學位，在加入澳大前曾任康奈爾大學法學院的講席教授。法學院特聘教授兼實證法學研究中心主任劉建宏是亞洲犯罪學研究的權威人士，他在實證法學的研究在整個亞洲乃至全世界都有重要影響力。」

駱教授指出：「法律和其他學科的不同之處在於，它有強烈的地方性。因此，法學院在人才培養和教學方面結合澳門本地的法律制度和體系展開。我們還開設了法律導論和法律實務的學位後課程，法律導論課主要為那些在澳門以外的地區學習法律，但回澳後需要了解澳門法律的基本知識和制度的人士開設。法律實務課則注重實踐教學，從操作層面入手，幫助學生迅速進入工作角色，提高效率。」

The Basic Law: Lifeline of the "One Country, Two Systems"

The year 2024 marks the 25th anniversary of Macao's handover to China, as well as the 25th year of the successful implementation of the "One Country, Two Systems" policy and the Basic Law in Macao. Under the guidance of the central government and the Macao SAR government, and the joint efforts of all sectors of the community, Macao has achieved remarkable progress and notable accomplishments in the past 25 years. The achievements include economic growth, social stability, and cultural integration. The past 25 years have provided evidence that "One Country, Two Systems" is the key for maintaining long-term prosperity and stability in Macao.

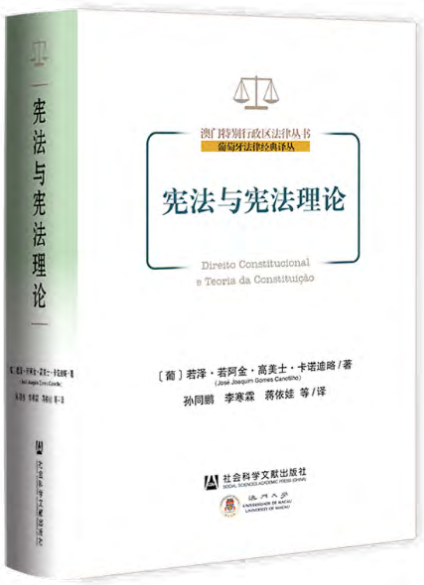
The Basic Law serves as both the legal guarantee and solid foundation of the "One Country, Two Systems" policy. Wai Kin Lok, a professor of the Faculty of Law, describes the Basic Law as the "lifeline" of "One Country, Two Systems". He has a deep connection with the Basic Law; he has been involved in the drafting, research, and teaching of the Basic Law of both Hong Kong and Macao. Professor Lok believes that the Basic Law plays a crucial role in three aspects. Firstly, it serves as the fundamental guideline for maintaining social order, ensuring the overall stability of Macao society. Before the handover, Macao faced serious public security challenges, leading to psychological panic among its citizens. However, with the support of the central government and the efforts of the SAR government, these issues were swiftly addressed. As a result, Macao has become one of the safest cities in the world. Secondly, the Basic Law guarantees Macao's economic development. Prior to the handover, Macao experienced a continuous economic downturn, and lacked confidence in its post-handover economy. The implementation of the Basic Law enabled Macao to embark on considerable deregulation of tourism and gaming industries. It also provided essential legal protection for land development, foreign trade, finance, and currency systems. These measures paved the way for a significant leap in Macao's economic growth after its return. In addition, from a national perspective, the implementation of the Basic Law safeguards national sovereignty and ensures national security, thereby serving the long-term development interests of the country. In accordance with the provisions of the Basic Law, Macao established the National Security Law as early as 2009, which plays an important role in safeguarding national security and enables timely prevention of any threats to it.

Constitutional Law and Basic Law Studies: Serving the Steady Implementation of "One Country, Two Systems"

In 2018, UM established the Centre for Constitutional Law and Basic Law Studies. In 2019, it became a partner base of the Centre for Constitution Administrative Law Studies of Peking University, a key research centre in the field of humanities and social sciences under the Ministry of Education of China. The Centre for Constitutional Law and Basic Law Studies is dedicated to promoting constitutional and the Basic Law knowledge, enhancing constitutional awareness, and advancing the practice of "One Country, Two Systems" in Macao. The Centre not only offers general education courses on the Constitution and the Basic Law to UM students but also collaborates with government departments to train talents to promote understanding of the Constitution and the Basic Law, including primary and secondary school teachers.

Since 2018, the Centre has conducted systematic research on the teaching of the Constitutional and Basic Law, and has received support from relevant central government departments and the SAR government. In 2020, the Ministry of Education officially commissioned the Centre to carry out systematic research on the popular education of the Constitution and Basic Law of the Macao SAR. It also conducted two research projects in collaboration with the Macao Basic Law Promotion Association (ADLBM) on the feasibility of systematic teaching of the Constitution and the Basic Law in higher education institutions, and primary and secondary schools in Macao.

憲法與基本法研究中心牌匾
Plaque of the Centre for Constitutional Law and Basic Law Studies



法學院組織的"葡萄牙法律經典譯叢"之《憲法與憲法理論》
Constitutional Law and Theory of the Constitution, one of the "Portuguese Legal Classics Translation Series" of the Faculty of Law

Professor Lok remarks, "Due to Macao's limited land area, its development is constrained. While Hengqin, located just across the river from Macao, offers a broader space for development. The advantage of 'One Country, Two Systems' lies in the country's ability to support Macao's development easily. In a short period of time, a designated area in Hengqin was allocated to facilitate the construction of UM campus, with Macao maintaining jurisdiction and applying its laws." Io Cheng Tong, Dean and Professor of the Faculty of Law, and Director of the Centre for Judicial and Legal Studies of China and Portuguese-Speaking Countries, also states, "'One Country, Two Systems' is a great concept. The development of UM, which we have personally experienced and witnessed, is made possible with the support of the country. It is important for us to deeply understand the relationship between 'One Country' and 'Two Systems' and actively integrate ourselves into the national development agenda. This is the attitude we should adopt for the future."

Distinctive Legal Research: Serving Local and Going Global

The Faculty of Law of UM created the comprehensive academic journal *Macau Law Review* as early as 2005. Over time, it has become the most authoritative and influential law journal in Macao. The Journal is also indexed in the PKU Law Database, the CNKI Overseas Edition, the National Center for Philosophy and Social Science Documentation, and the China Social Science Excellence. To actively promote the exchange and connection of legal systems between Guangdong and Macao, the *Macau Law Review* introduced a special column on "Research on Rule of Law in Guangdong-Macao Deep Cooperation Zone" in September 2021. This column serves as a research platform for the development of rule of law in the Cooperation Zone.

In addition to focusing on research in the Macao region, the Faculty of Law of UM has extended its legal research across Asia. Professor Jianhong Liu, a distinguished professor at the Faculty of Law, is a leading figure in the development of Asian criminology and serves as the editor-in-chief of the *Asian Journal of Criminology.* This journal is the first criminology journal in Asia to have been included in the Social Sciences Citation Index (SSCI), and has been committed to promoting the development of Asian criminology and Chinese criminology. Its multidisciplinary approach spans a wide range of disciplines, including criminology, law, criminal justice, sociology, psychology, forensic science, social work, urban studies, history, and geography. Under the leadership of Professor Liu, the *Asian Journal of Criminology* has developed rapidly and continued to expand its influence. In the Journal Citation Reports (JCR), the 2022 Impact Factor of the *Asian Journal of Criminology* is 1.9, and it ranked third among the regional criminology journals worldwide. The journal has been continuously ranked in the top 10% of law journals for the past few years in the SCImago Journal Ranking (SJR) and Scopus CiteScore™, two prestigious international journal ranking indicators. It has also advanced to the SSCI Q2, becoming one of the very few journals to be ranked highly in all three authoritative ranking indicators in the world, gaining widespread recognition in the field of criminology and further enhancing the academic reputation of legal research of UM.

The legal system of Macao has a deep historical connection with Portugal. In the context of the Belt and Road Initiative, China's close ties with Portuguese-speaking countries have led to an increased demand for judicial cooperation between the two sides. To leverage Macao's role as a bridge between China and Portuguese-speaking countries, the Faculty of Law of UM and the Supreme People's Court of China jointly established the Centre for Judicial and Legal Studies of China and Portuguese-Speaking Countries in September 2023. Professor Tong expresses, "It is a great honour for UM to establish this Centre with the Supreme People's Court of China. The mission of the Centre is to enhance interaction and communication with legal and judicial communities in Portuguese-speaking countries. Based on this, we will develop databases of Chinese and Portuguese laws, cases, and legal information, and enhance the mechanism of foreign law ascertainment. In addition, the Faculty of Law will leverage the advantage of having bilingual legal professionals in Macao to further develop research on Portuguese law."

As a legal professional proficient in Chinese, English, and Portuguese, Professor Tong has also been involved in Roman law. He explains, "Most of our faculty members are bilingual or multilingual. With our language advantage, we have been showcasing our legal research on a global scale. We do not only study international law, European Union law, and comparative law, but also present the development of the rule of law in China to the world, thus promoting the internationalisation of Chinese legal research."

Training Legal Talents: Meeting the Demands of the Country and Macao

Since its establishment, the Faculty of Law of UM has been dedicated to the mission of training local legal talents. Most of the legal professionals in Macao, including judges, prosecutors, lawyers, and legal personnel working in the SAR government, are graduates from UM. The Faculty offers bachelor of law programmes in Chinese and Portuguese, as well as bilingual programmes. It also offers master of law and postgraduate certificate programmes in Chinese, Portuguese, and English, along with a doctoral programme. In the 2023/2024 academic year, the Faculty of Law introduced a new programme namely the "Bachelor of Law in Chinese Law and Global Legal Studies", which is instructed in English. This programme offers students a unique learning opportunity to explore both the core legal topics in traditional Chinese legal education and the major courses covering the globalising international legal order that governs the world' s international relations. Professor Tong explains, "The launch of this programme aims to cultivate bilingual legal professionals with a global mindset and international competitiveness. Since its launch in 2023, the programme has gained significant attention from local and mainland students; moreover a considerable number of international students have shown interest in studying Chinese law through this programme. Over a thousand applications were received."

The Faculty of Law distinguishes itself through its faculty members. It regularly invites internationally renowned legal scholars as visiting professors and employs current judges, prosecutors, lawyers and legal experts from government departments as part-time instructors. This not only enhances students' international perspectives but also provides practical legal experience. Professor Tong highlights, "In recent years, the Faculty of Law has achieved remarkable progress in recruiting world top-notch legal scholars. Professor Xingzhong Yu, a chair professor of the Faculty of Law and Director of the Institute for Advanced Studies in Humanities and Social Sciences, is an internationally recognised scholar in the field of jurisprudence. He obtained his Master of Laws and Doctor of Juridical Science from Harvard University and served as a tenured professor at Cornell Law School before joining UM. Jianhong Liu, a distinguished professor of the Faculty of Law and Director of the Centre for Empirical Legal Studies, is an authority in the field of Asian criminology. His research in empirical legal studies carries significant influence in Asia and worldwide."

Professor Lok emphasises, "Compared to other disciplines, the distinctiveness of law lies in its strong local nature. Therefore, the Faculty of Law integrates the local legal system with talent cultivation. We also offer postgraduate diploma programmes namely Introduction to Macau Law Programme and Improvement of Legal Practice and Language Programme. The Introduction to Macau Law Programme is designed for people who studied law outside of Macao. It aims to provide them with the fundamental knowledge and understanding of Macau law upon their return. The Improvement of Legal Practice and Language Programme targets to help students quickly adapt to their roles in the workplace and enhance their efficiency. It focuses on practical skills instruction starting from an operational level."

為澳門打造特色多元的「世界旅遊休閒中心」

Building a Distinctive and Diversified "World Centre of Tourism and Leisure" for Macao

文：關詠瑜
Chinese & English Text: Christy Kuan

圖：馬文華、趙怡瑋、部分由受訪者提供
Photo: Martin Ma, Eva Zhao, partially provided by the interviewee

澳門自 1999 年回歸祖國後，正逐步將經濟重心轉移至旅遊產業為目標邁進。近年澳門特區政府致力促進經濟適度多元，以「1+4」適度多元發展策略為重心，深化「旅遊 +」跨界融合，積極推動旅遊業發展。政府亦大力推進「世界旅遊休閒中心」建設，配以聯合國教科文組織創意美食之都和世界遺產名錄「澳門歷史城區」的旅遊資源優勢，進一步豐富其內涵。

發展智慧旅遊、利用大數據、智能化等信息技術，提升科技多元體驗等元素，將對該目標的實現發揮關鍵作用。澳門大學作為一所國際化綜合性公立大學，秉承為社會服務的重任，透過研究服務與人才培養貢獻社會。澳大亞太經濟與管理研究所的智慧旅遊研究團隊，重點關注智慧旅遊的技術研發，並透過跨學科研究大力創新。澳大工商管理學院綜合度假村及旅遊管理學系重點培育綜合性旅遊專業人才，助力澳門建設「世界旅遊休閒中心」。

Since the return of Macao to China in 1999, economic focus has been gradually shifting towards developing tourism industry. In recent years, the Macao SAR government has endeavoured to promote appropriate economic diversification by focusing on the "1+4" development strategy, deepening integration across the sectors of "tourism+", and actively promoting the development of the tourism industry. The government also vigorously promotes the building of the "World Centre of Tourism and Leisure", which has been further enriched by being recognised as the UNESCO Creative City of Gastronomy and "The Historic Centre of Macao" on the World Heritage List.

The development of smart tourism, the adoption of information technologies such as big data and artificial intelligence, and the technological enhancement of diversified tourism experiences will play a crucial role in achieving this goal. As an international public comprehensive university, UM is committed to serving the community through research and talent development. The Smart Tourism research team of the Asia-Pacific Academy of Economics and Management of UM focuses on the research and development of smart tourism technologies and actively promotes innovation through interdisciplinary research. The Department of Integrated Resort and Tourism Management of the Faculty of Business Administration of UM focuses on nurturing integrated tourism professionals to support Macao in building a "World Centre of Tourism and Leisure".

澳門回歸：旅遊業的重要變化

2024年是澳門回歸祖國25周年，在澳門特區政府和社會各界的共同努力下，澳門經濟及民生等方面正逐漸穩步提升。回顧澳門過去二十五年的變化，經濟產業重心的逐步轉移，以及新冠肺炎疫情後澳門的機遇與挑戰，皆是值得關注的重點。為促進經濟適度多元發展，特區政府將綜合旅遊業作為重點支柱產業，並開展一系列的措施為城市經濟復甦注入動力，持續打造澳門成為「世界旅遊休閒中心」。

羅振雄教授
Professor Rob Law

羅振雄是澳門大學發展基金會智慧旅遊講座教授兼亞太經濟與管理研究所副所長，曾獲 100多項與研究相關的獎項和榮譽，並被嘉許為全球最多產和最具影響力的旅遊及款客服務學科學者之一。他認為，自澳門回歸以來，特區政府通過開拓多元化的旅遊市場、提升旅遊配套設施和服務水平等相關措施，令澳門的旅遊吸引力得到了顯著提升。他指出：「澳門擁有豐富的旅遊資源，包括歷史文化遺產、美食、娛樂和文化活動等，再加上澳門各大知名酒店品牌提供的優質住宿服務以及便利的交通基礎設施，吸引了更多的旅客來澳門旅遊。政府近年也不斷推出新的旅遊產品和服務，如文化節慶、主題公園、文創活動等，為遊客提供更多元化的旅遊體驗。」

羅教授認為，儘管旅遊形式不斷變化，但來澳門的旅客基本性質不會改變。他表示：「澳門本身具有得天獨厚的優勢，不論是過去還是現在，大部份客源來自於國內大灣區，主要是因為澳門地小物博，對國內旅客來說地點優越，交通方便，旅遊成本低，非常適合短途出遊，可以說比澳門更出色的競爭對手非常少。」

疫後澳門：新業態的改變與智慧旅遊的發展

2019 年新冠肺炎來襲導致訪澳旅客數量銳減，但近年隨着全球疫情得到控制，旅遊需求逐漸恢復。羅教授認為疫情反而加速了智慧旅遊的發展。為了適應新的旅遊環境，政府積極推動了數位化旅遊和線上宣傳，促進了智慧旅遊的發展及元宇宙旅遊的誕生。

對羅教授來說，智慧旅遊的定義是利用科技增強旅客的感知，使旅遊的經歷更豐富。他闡述：「智慧旅遊涉及到整個旅程包括衣食住行等方面，從出發前的線上資料搜集，到抵達目的地享受旅遊過程，再到離開後在社交媒體上分享體驗。利用科技使信息互通變得更快、更準、更廣，為旅客提供更便捷、舒適和個性化的旅遊體驗，提升旅遊業的水平和服務質量。」

羅教授表明，發展智慧旅遊有助增強旅遊體驗，改善旅遊承載力，對於促進澳門旅遊業可持續發展以及鞏固「世界旅遊休閒中心」的地位非常重要。他強調：「智慧旅遊的推行將顯著提高旅遊的便利性、參與性和品質，通過智慧客流應用，協助旅客提前感知旅遊資訊，預判景點人流情況，享受個性化旅遊服務。另一方面，智慧旅遊可以提高旅遊資源的利用效率，通過智慧化的管理和監測手段，保護景點和環境的旅遊承載力，通過智能化的景點門票預售和分流措施，控制遊客數量在環境承載力範圍內。」

苗莉教授
Professor Li Miao

澳門大學發展基金會綜合度假村及旅遊管理傑出學人教授兼工商管理學院綜合度假村及旅遊管理學系系主任苗莉認為，疫情後的澳門呈現了新的業態變化，更發展出多種新興的旅遊形式。她舉例說：「比如現在非常火的『特種兵旅遊』，隨時來一趟說走就走的旅程，還有通過城市漫遊，在平凡生活中尋找不平凡。」苗教授認為這些例子體現出人們對旅遊認知和體驗上的變化，更突顯出旅遊休閒對生活的重要性。她強調：「儘管旅遊形式一直在改變，但從古到今不變的是，旅遊是人類骨子裡的需要，是生活的一部分。

用科技增強旅遊感知，深化人與科技交互體驗

在人工智能（AI）的發展下，增強現實（AR）和虛擬現實（VR）技術令物理與虛擬空間的交互融合，深化了旅遊空間的應用。苗教授強調利用新科技為旅遊業賦能的重要性，通過澳門豐富世界文化遺產及中西文化交互的旅遊資源優勢，為旅客提供全新的感知體驗。苗教授說：「過去我們見到的大三巴牌坊只能是一個遺跡，無法有進一步的互動。但現在通過科技賦予的空間感，比如利用線上 VR 虛擬展廳及 AR 應用程式提供有關歷史遺跡的互動資訊，讓旅客能身處同樣的空間去感受不一樣的沉浸式感官體驗。」

苗教授專注於研究人與科技的互動體驗，並樂於發掘 AI 對人們對旅遊目的地的記憶的影響。苗教授透過 AI 繪圖工具繪畫出根據她腦海中幻想的旅遊目的地生成的畫作，她發現：「即使我親身到達過旅遊目的地如阿拉斯加，也看過當地真實的風景，但腦海中記得的卻是 AI 根據我描述所呈現的畫面，體現出人的旅遊記憶和體驗是可以通過科技被改變和創造。」

苗教授透過 AI 繪圖工具生成的圖像：一位亞洲女孩在阿拉斯加旅遊（左） 及澳門元宇宙（右）
Images generated by Professor Miao using AI drawing tools: an Asian girl travelling in Alaska (left); Macao Metaverse (right)

橫琴粵澳深度合作：開拓多元旅遊市場

為推動澳門經濟適度多元，《橫琴粵澳深度合作區建設總體方案》提到將透過深合區發展，繼續加快推進澳門與橫琴的旅遊合作，打造聯合大灣區的旅遊品牌。

羅教授認為可實現琴澳兩地旅遊資源的整合、聯動與互補，結合澳門豐富文化娛樂資源與大灣區自然風光的優勢，聯合推動跨境旅遊產品合作。另外可建立旅遊產業聯盟，通過合作共用資源和市場訊息，共同拓展多元市場，例如開發年輕一代及文化體驗遊客等新興市場。並可推廣無人機航拍、VR體驗等新旅遊業態，滿足遊客不斷升級的消費需求。此外，琴澳兩地共同發展「智慧會展」的潛力巨大，澳門可參考深圳借助大灣區內成熟的5G、物聯網及數據挖掘等技術為會展人員提供資訊增值服務。並可加強跨境交通配套，提升通關政策的便利性，如增發兩地跨境旅遊巴士及發放更多琴澳互通的車牌等。

羅教授表示澳門作為內地通往海外的橋頭堡，可借助「一國兩制」的制度優勢，加強與內地和海外旅遊目的地的合作關係。同時，澳門可積極參與「一帶一路」建設，利用自身地理位置優勢和港口特色，打造成為中國與其他國家間貿易和文化交流的樞紐，積極承辦國際會議、文化交流活動、體育賽事等，吸引更多外國遊客旅遊和投資。另外，推動「旅遊+」會展、文創、電商、體育等新興產業聯動發展，協同實現效應更大化，提高澳門的國際知名度和影響力。

智慧旅遊研究與人才培養：助力澳門旅遊業發展

為促進澳門經濟適度多元發展，特區政府重點深化「旅遊 +」跨界融合，並鼓勵設置配合產業發展相應的高等教育課程。澳大通過智慧旅遊研究及人才培養，助力推動澳門旅遊業的發展。

澳大亞太經濟與管理研究所重點關注智慧旅遊的技術研發，包括大數據分析、人工智能等領域，並採取一系列措施，如舉辦國際會議及研討會、出版研究報告以及與業界合作等。羅教授表示，該團隊已經開展了關於旅遊產業發展趨勢、智慧旅遊技術應用、遊客行為分析等相關主題的研究，為澳門旅遊休閒領域發展及智慧旅遊技術應用提供更多策略和建議。未來，研究所將進一步深化對智慧旅遊技術的研究，開展關於可持續旅遊發展和遊客體驗提升的研究專案，加強與政府和旅遊業者的合作，並積極拓展與內地和海外旅遊目的地的合作與交流，共同打造跨境學術共同體。

工商管理學院配備各種旅遊款客設施供學生親身體驗：咖啡實驗室（左）及模擬酒店客房（右）
The Faculty of Business Administration is equipped with various hospitality facilities for students to have hands-on experience: Café Lab (left); Mock Hotel Room (right)

澳大於 2019 年開設了綜合度假村及旅遊管理學系，支持培養綜合型旅遊專業人才，以滿足旅遊企業和市場的需求。身為該學系主任的苗教授表示，學系的課程設計會根據未來需求不斷調整，充分利用澳大在計算機科學、大數據分析等學科的優勢，並加強「旅遊 +」等的前沿元素。苗教授說：「澳門旅遊業的未來需要通才，他們需要融會貫通，涉獵和了解多方面的知識，並需從知識學習中進一步延伸應用能力。借助先進科技為人類賦能，讓我們能夠從重複性的工作解放出來，並充分發揮機器無法取替的思維創造力。」

The Handover of Macao: Significant Changes for the Tourism Industry

The year 2024 marks the 25th anniversary of Macao's return to China. Through the joint efforts of the Macao SAR government and all sectors of the community, there has been a gradual and steady improvement in Macao's economy and people's livelihood. Reflecting on the changes in Macao over the past 25 years, the gradual shift in its economic industry focus, as well as the opportunities and challenges faced by Macao after the COVID-19 pandemic, are all key points deserving attention. To promote appropriate economic diversification, the SAR government has given full play to the leading function of integrated tourism as the key pillar industry. A series of measures were introduced to promote the city's economic recovery and to continuously striving to build Macao as a "World Travel and Leisure Centre."

Rob Law is University of Macau Development Foundation (UMDF) Chair Professor of Smart Tourism and the Deputy Director of the Asia-Pacific Academy of Economics and Management. He has received over 100 research related awards and accolades and is considered one of the most prolific and influential scholars in the field of tourism and hospitality in the world. He believes that since the handover of Macao, the SAR government has significantly enhanced the attractiveness of Macao tourism by placing various measures in exploring diversified tourism markets and improving tourism facilities and services. He points out, "Macao is rich in tourism resources, including historical and cultural heritage, culinary delights, entertainment, and cultural activities. Coupled with the high-quality accommodation services provided by the city's renowned hotel brands and convenient transportation infrastructure, more tourists are drawn to visit Macao. In recent years, the government has also been launching new tourism products and services, such as cultural festivals, theme parks, and cultural and creative activities, to offer visitors a more diversified travel experience."

Professor Law believes that despite the ever-changing forms of tourism, the fundamental nature of visitors to Macao will remain unchanged. He states, "Macao has its own unique advantages. Today, as in the past, the majority of visitors come from the Greater Bay Area of mainland China. It is mainly because Macao is a small place with diverse attractions, making it a convenient and cost-effective travel destination for short getaways to tourists from mainland China. It can be said that there are very few competitors who can outperform Macao."

羅振雄教授榮獲國際知名旅遊期刊《Information Technology & Tourism》2023 年度最佳論文獎

Professor Law receives Best Article of the Year Award in 2023 from the *Journal of Information Technology & Tourism*

Post-pandemic Macao: Changes in New Business and Smart Tourism Development

The outbreak of COVID-19 in 2019 led to a sharp decline in visitor arrivals to Macao, but travel demand has gradually recovered in recent years as the global pandemic has been brought under control. Professor Law believes that the pandemic has accelerated the development of smart tourism. In order to adapt to the new tourism environment, the government has actively promoted digital tourism and online marketing campaigns, which has fostered the development of smart tourism and the emergence of metaverse tourism.

According to Professor Law, smart tourism is defined as using technology to enhance tourists' perceptions and enrich their travel experience. He explains, "Smart tourism encompasses the entire journey, including clothing, dining, accommodation, and transportation. It starts from online information search before departure, to enjoying the travelling process upon arrival at the destination, and sharing the experience on social media after departure. The use of technology enables faster, more accurate, and wider information exchange. It provides tourists with convenient, comfortable, and personalised travel experiences, ultimately raising both the service level and quality of the tourism industry."

Professor Law expresses that the development of smart tourism can help to enhance the travel experience and improve tourism carrying capacity. It is crucial for facilitating the sustainable development of the tourism industry in Macao, as well as consolidating its position as a "World Centre of Tourism and Leisure". He emphasises, "The implementation of smart tourism will significantly enhance the convenience, involvement, and quality of travel. Through the smart applications for visitor flows, it assists tourists in accessing travel information in advance, anticipating visitor flow at landmarks, and enjoying personalised travel services. On the other hand, smart tourism can also improve the efficiency of utilising tourism resources, protect the tourism carrying capacity of landmarks and the environment through intelligent management and monitoring methods. It can help control the number of visitors within the environmental carrying capacity through intelligent pre-sale ticketing and diversion measures at landmarks."

澳大舉辦座談會探討智慧旅遊
UM held a seminar to discuss smart tourism

Li Miao, UMDF Professorial Fellow of Integrated Resort and Tourism Management and Head of the Department of Integrated Resort and Tourism Management of the Faculty of Business Administration, believes that post-pandemic Macao has witnessed new changes in the tourism industry and the emergence of various new forms of tourism. She cites examples, "For instance, there are now the very popular 'special forces travel', where people can embark on spontaneous journeys at any moment, and city walks, where people seek the extraordinary in ordinary life." Professor Miao believes that these examples reflect the changes in people's perception and experience of travelling, highlighting the importance of travel and leisure in their lives. She emphasises, "Although the forms of travel have been constantly changing, what has remained unchanged throughout ages is that travelling is an innate human need and an integral part of life."

Enhancing Sensory Experience of Travelling with Technology, Deepening Human-Technology Interactive Experience

With the development of artificial intelligence (AI), augmented reality (AR) and virtual reality (VR) technologies have deepened the application of tourist spaces by enabling the integration and interaction between physical and virtual space. Professor Miao emphasises the importance of using advanced technologies to empower the tourism industry. It aims to provide tourists with a completely new sensory experience by leveraging Macao's rich world cultural heritage and its integration between Eastern and Western cultures. Professor Miao says, "In the past, we could only see the Ruins of St. Paul' s as a relic that could not be further interacted with. But now, through the use of technology to create a sense of space, such as using online VR galleries and AR applications to provide interactive information about historical sites, tourists can enjoy a different immersive sensory experience in the same space."

Professor Miao focuses on research into the interactive experience between humans and technology. She is enthusiastic about exploring the impact of AI on people's memories of travel destinations. Using AI drawing tools to generate images depicting travel destinations based on her imagination, Professor Miao discovered that, "Even though I have been to travel destinations such as Alaska in person and had seen the real scenery there, what I remember in my mind is the image presented by AI based on my descriptions, illustrating how human travelling memories and experiences can be altered and created through technology."

In-Depth Cooperation between Guangdong and Macao in Hengqin: Explore Diversified Tourism Markets

To promote appropriate economic diversification in Macao, the "General Plan for Building a Guangdong-Macao In-Depth Cooperation Zone in Hengqin" mentions that it will continue to speed up the tourism cooperation between Macao and Hengqin, and jointly create a Greater Bay Area tourism brand through the development of the Cooperation Zone.

Professor Law suggests in achieving the integration, linkage, and complementarity of tourism resources between Hengqin and Macao, combining Macao's rich cultural and entertainment resources with natural scenery in the Greater Bay Area, and jointly promoting cooperation in cross-border tourism products. In addition, tourism industry alliances can be established to jointly develop diversified markets through the sharing of resources and market information, targeting emerging markets such as the younger generation and cultural experience tourists. The development of new travel businesses such as aerial photography by drones and VR experiences can also be promoted to satisfy tourists' escalating consumption demands. Furthermore, there is huge potential for Hengqin and Macao to jointly develop "smart MICE (MICE refers to Meetings, Incentives, Conferences, and Exhibitions)". Macao can learn from Shenzhen in providing value-added information services to MICE participants by leveraging mature technologies in the Greater Bay Area, such as 5G, Internet of Things (IoT), and data mining. The two places can also strengthen cross-border transport support and enhance the convenience of customs clearance policies through actions such as increasing the number of cross-border coaches and issuing more vehicle license plates for seamless travel between Hengqin and Macao.

Professor Law expresses that Macao, as a gateway from the mainland to overseas, can leverage the advantages of the "One Country, Two Systems" policy to strengthen cooperation with mainland and overseas tourist destinations. At the same time, Macao can actively participate in the Belt and Road Initiative, utilising its geographical advantages and characteristics as a port to become a hub for trade and cultural exchanges between China and other countries. In addition, Macao can actively host international conferences, cultural exchange activities, sports events to attract more foreign tourists and investments. Furthermore, promoting the integrated development of "tourism+" between tourism and emerging industries including MICE, culture and creativity, e-commerce, and sports, achieving greater synergy and enhancing Macao's international reputation and influence.

Smart Tourism Research and Talent Development: Empowering the Development of the Tourism Industry in Macao

To promote appropriate economic diversification in Macao, the SAR government focuses on deepening integration across sectors of "tourism+" and encourages the establishment of higher education programmes that align with industry development. Through research on smart tourism and talent development, UM strives to contribute to the development of the tourism industry in Macao.

The Asia-Pacific Academy of Economics and Management (APAEM) of UM focuses on the research and development of smart tourism technologies, including areas in big data analytics and AI. It has adopted a series of measures such as hosting international conferences and seminars, publishing research reports, and collaborating with the industry. Professor Law states that the team has already initiated research on topics related to the development trend of the tourism industry, smart tourism technology applications, and visitor behaviour analysis. It aims to provide more strategies and recommendations for the development of the tourism and leisure sector in Macao as well as the application of smart tourism technologies. In the future, APAEM will further deepen its research on smart tourism technologies, conduct research projects on sustainable tourism development and visitor experience enhancement. It will also strengthen cooperation with the government and tourism operators, and actively expand cooperation and exchanges with mainland and overseas tourist destinations to create a cross-border academic community.

亞太經濟與管理研究所牌匾
Plaque of the Asia-Pacific Academy of Economics and Management

UM has established the Department of Integrated Resort and Tourism Management in 2019 to support the development of integrated tourism professionals to meet the needs of tourism enterprises and the market. Professor Miao, serving as the Head of the Department, states that the curriculum design of the department will be continuously adjusted according to future demands, leveraging the University's strengths in disciplines such as computer science and big data analytics, as well as strengthening cutting-edge elements such as "tourism+". Professor Miao says, "The future of Macao's tourism industry requires generalists who are well versed in a wide range of knowledge and can further extend their application skills from knowledge acquisition. By empowering humans with advanced technology, we will free ourselves from repetitive tasks and fully unleash creative thinking that cannot be replaced by machines."

建設中華醫藥創新高地，服務澳門產業多元發展

Building a Hub for Chinese Medicine Innovation to Foster Diversified Industry Development in Macao

文：黃蕾君
Chinese & English Text: Lexie Huang

圖：由受訪者提供
Photo: Provided by the interviewee

2024 年是澳門回歸祖國 25 周年，回顧澳門中醫藥發展歷程，正是以創新為動力，整合優勢資源，對標國際前沿，銳意創新探索，走出有澳門特色的中醫藥創新之路，成為澳門成功實踐「一國兩制」的亮點之一。澳大 2002 年設立中華醫藥研究院，並於 2010 年獲批中藥質量研究國家重點實驗室（澳門大學）。2020 年，獲特區政府批准，澳大創建澳門第一個中醫藥研發轉化平台——澳門中藥研發中心，該平台聚焦經典名方、配方顆粒以及創新中藥的研究。經過 3 年的籌備，澳門大學澳門中藥檢測中心亦於 2024 年 3 月啟動試運營。通過中藥質量研究國家重點實驗室（澳門大學）、澳門中藥研發中心和澳門大學澳門中藥檢測中心上下游聯動，澳大形成中藥科技創新、研發轉化和質量檢定的「一核兩翼」架構，在不同層次加強科技成果的研發和轉化。

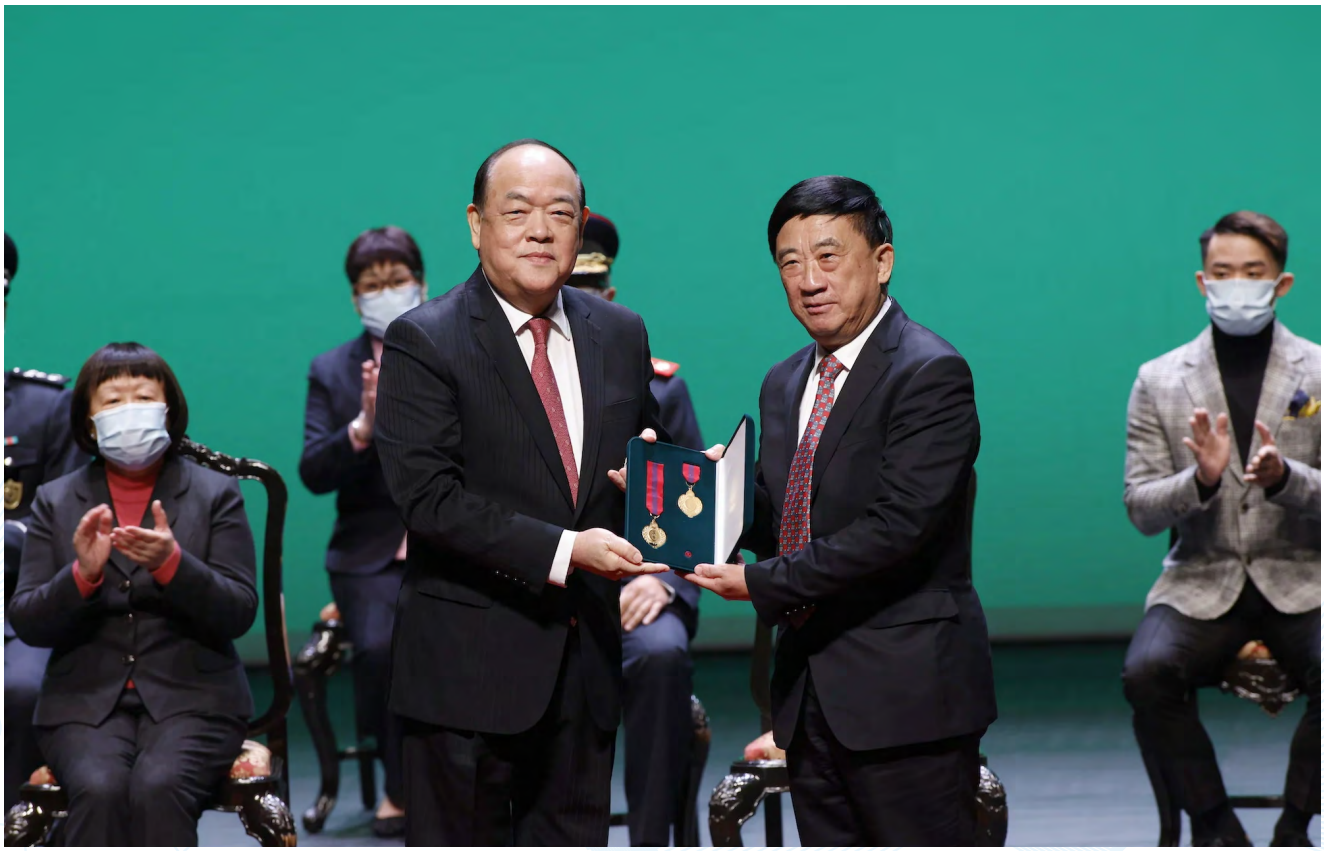
The year 2024 marks the 25th anniversary of Macao's handover to China. Looking back at the development of Chinese medicine in Macao, it has taken an innovative and unique path. Driven by innovation, it has integrated advantageous resources and has been benchmarked against international standards. Over time, the development of Chinese medicine has become a highlight in the implementation of the "One Country, Two Systems" policy in Macao. In 2002, UM set up the Institute of Chinese Medical Sciences (ICMS). In 2010, UM received approval to establish the State Key Laboratory of Quality Research in Chinese Medicine (University of Macau) [SKL-QRCM (UM)]. In 2020, the Macao SAR government approved the establishment of the Macao Centre for Research and Development in Chinese Medicine (MCR&DCM), serving as the first platform for the translation of innovative research and development results of Chinese medicine in Macao. This platform focuses on research into classic formulas, granules, and innovative Chinese medicine. In addition, the Macao Centre for Testing of Chinese Medicine, University of Macau (MCTCM) has also started trial operation in March 2024 after three years of preparation. By integrating SKL-QRCM (UM), MCR&DCM, and MCTCM, UM has formed a "one core, two wings" framework (one core refers to Chinese medicine innovation, two wings refer to research outputs translation and quality testing). This framework aims to strengthen the research and development (R&D) and translation of scientific and technological outputs at different levels.

從 0 到 1，開拓創新

2002年，應時任澳門特區行政長官何厚鏵和澳門大學的邀請，王一濤教授來到澳門，從此紮根澳門的中醫藥教育和產業發展至今。20多年來，王一濤教授為澳門中醫藥人才培養、科學研究、研發轉化和產業發展開拓了一條創新實踐之路。他既是澳門中醫藥發展的參與者和見證者，也是推動者和貢獻者。在王教授的籌劃和組織下，澳大創立了中華醫藥研究院（時稱「中華醫藥研究所」），白手起家，從無到有，建立國際化創新人才培養體系。2008年，他率領團隊啟動國家重點實驗室籌備工作，瞄準制約中藥產業發展的關鍵環節——中藥質量，並在2010年獲國家科技部批准全國第一個中醫藥領域國家重點實驗室，為提升中藥品質和制定國際標準發揮重要作用，實驗室研究團隊亦獲澳門特區政府授予2021年度「澳門專業功績勳章」。

現今，澳大中華醫藥研究院和中藥質量研究國家重點實驗室（澳門大學）組建了一支國際化、高水平的師資團隊，其中超半數以上為全球2%頂尖科學家。他們既有對中華醫藥精髓的傳承能力，又有融合現代科技前沿的創新能力，還兼備優異的國際背景和科研經歷。研究院和國家重點實驗室聚焦中藥質量有效、安全、穩定、可控等核心要素，產出了大批具有國際影響力的研究成果。

王一濤是現任澳大中華醫藥研究院講座教授兼澳門中藥研發中心主任，他說：「澳門回歸後，在國家和特區政府的扶持下，在澳門中醫藥從業人員的努力下，澳門的中醫藥大健康產業有了良好的發展基礎。時間過得真快，我應邀來澳二十多年，有幸參與澳門中醫藥教育、科技和產業的重大發展歷程。我印象很深刻，當時中華醫藥研究院在舊校園的一間學生宿舍起步的，一步一個腳印開拓了澳門中醫藥的特色研究。現如今，澳大已經建成全球頂尖的中藥質量研究和創新研發平台。」



王一濤教授（右）代表中藥質量研究國家重點實驗室（澳門大學）團隊獲頒「專業功績勳章」
Professor Yitao Wang (right) received the "Medal of Merit – Professions" on behalf of the SKL-QRCM (UM)

人才培養，濟濟一堂

澳大中華醫藥研究院創始之初就定位培養現代化、國際化和複合型的中醫藥創新人才，致力培養學生三種能力：一是傳承創新能力，強調中華醫藥的菁華理念與現代科技的融合；二是科研創新能力，強調中華醫藥的學術創新與科技研發的轉化；三是國際拓展能力，強調相關學科的交叉匯聚與國際視野的實踐。22年來，研究院已培養畢業1,000餘名博碩士（其中包括全球2%頂級科學家30餘名），在校研究生連續多年奪得全國挑戰杯一等獎、全國青少年創新獎，以及40多項澳門博碩士研究生研發獎。其中不少優秀畢業生現已成為研究院和實驗室的骨幹成員。

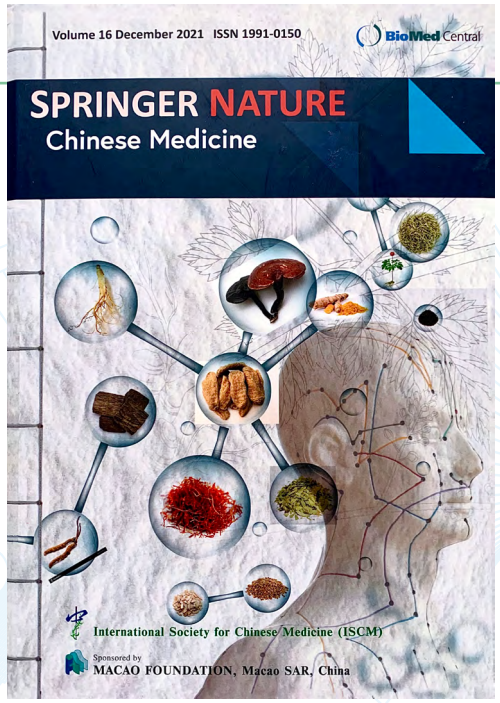
萬建波和王勝鵬皆是澳大成功培養的優秀中醫藥研究人員，榮獲多個研究獎項及殊榮，並為澳大中醫藥研究作出重要貢獻。萬建波是現任中華醫藥研究院教授兼課程主任，為澳大首屆中藥學碩士和博士畢業生。他主要從事中藥質量系統評價及代謝組學研究，發表 SCI 論文210餘篇，引用超過6,600餘次。萬教授更獲世界中醫藥學會聯合會中醫藥國際貢獻-科技進步一等獎，連續三年（2020-2023）入選全球頂尖2%科學家榜單，並擔任《Chinese Medicine》學報執行編輯。而王勝鵬是現任中華醫藥研究院助理教授、澳門中藥研發中心副主任兼中藥質量研究國家重點實驗室（澳門大學）項目主任。於澳大在學期間，他曾兩度榮獲澳門特區研究生科技研發獎，並獲得全國青少年科技創新獎。他主要聚焦中藥藥效物質研究與創新中藥研發，迄今發表 SCI 論文160餘篇，論文總被引7,200餘次。王勝鵬教授更入選2023全球高被引科學家、全球前2%頂尖科學家終身榜單和中華中醫藥學會青年托舉工程，獲日內瓦國際發明金獎、世界中醫藥學會聯合會中醫藥國際貢獻-科技進步一等獎等。

陳新作為中華醫藥研究院院長、特聘教授兼中藥質量研究國家重點實驗室主任，他認為：「澳大不僅培養眾多優秀碩博士生，亦通過各類人才計劃招聘和培養本地年輕學者，吸引澳門傑出人才留澳發展。研究院現有的39名教學人員中就有5名是澳門本地人才。」

多面佈局，走向國際

澳大中醫藥的國際化發展不僅體現在人才培養理念，亦貫徹於其他多個層面。早在2013年，澳大就創辦國際性中醫藥學術期刊《中華醫藥》，由王一濤教授任主編，由世界頂級出版社Spring Nature在倫敦出版，目前已成為中醫藥領域享有高聲譽和影響力的SCI學術期刊，2022年影響因數為4.9，五年影響因子達6.0。

王一濤教授亦指出：「中藥要在世界各地生產、銷售和使用，必須具備國際認可的質量標準，當中詳列中藥材內哪種活性成份是其質量指標。」因此，中藥質量研究國家重點實驗室（澳門大學）與美國藥典委員會、歐洲藥典委員會和中國食品藥品檢定研究院分別建立聯合實驗室，立項和完成的20餘項中藥質量標準已載入《美國藥典》《歐洲藥典》和《中國藥典》，涉及的中藥材包括三七、麥冬、枸杞、蛹蟲草、人工蟲草菌粉、高良薑、鐵皮石斛、廣藿香、餘甘子等。



《中華醫藥》期刊
Chinese Medicine Journal

陳新教授強調：「澳大的中醫藥走小而精的發展路線，國際合作是中華醫藥研究院的一大特色，經過多年的努力，我們已與全球100多間頂尖大學、研究機構和醫院例如哈佛大學、劍橋大學、清華大學、香港大學等建立了合作網絡。近年來，我們還推出各類學術研討活動，包括澳門中醫藥與天然藥物國際研討會暨第一屆澳門藥學國際研討會、特邀嘉賓研討會系列，拓展國際合作網絡。」

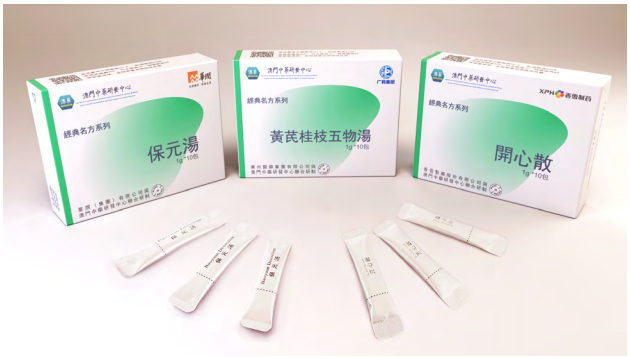
中華醫藥研究院與全球頂尖高校和科研機構建立合作網絡
ICMS has established a cooperation network with top universities and research institutions globally

研發轉化，產學協同

近年來，特區政府積極採取「1+4」經濟適度多元發展策略，推動包括中醫藥大健康在內的四大產業發展，並在《澳門特別行政區經濟和社會發展第二個五年規劃（2021-2025）》、《澳門特別行政區經濟適度多元發展規劃（2024-2028）》等多個重要文件中對中醫藥大健康產業發展作出詳細規劃和部署。

在澳門科學技術發展基金支持下，2020年10月特區政府批准成立澳門特區第一個創新研發與轉化平台——澳門中藥研發中心，由王一濤教授出任主任。澳門中藥研發中心與多間世界500強藥企、中國中醫科學院中藥研究所和香港中藥創新研發中心聯合，共同開展12個經典名方、100個配方顆粒、8個名優成藥升級開發、10餘個國際化方藥精品研發轉化。經過三年的探索和發展，澳門中藥研發中心已建成行業頂尖的產學協同創新共同體和研發轉化平台，順利完成第一期的三年平台建設和研發項目任務，並順利通過驗收，專家組對中心給予了高度評價。

為推動澳門中醫藥產業的發展，中華醫藥研究院自2022年起籌建澳門大學澳門中藥檢測中心，不僅為澳門



澳門中藥研發中心的研發成果
Research outputs of the Macao Centre for Research and Development in Chinese Medicine

藥監局提供技術支撐，還以「發展澳門檢測，實現澳門認證，助力澳門中藥產業化和國際化發展」為目標，加強中藥檢測的特色項目開發，為澳門中藥品牌提供有力的技術支持和保障。2023年5月，中藥檢測中心獲得CNAS首項ISO/IEC 17025：2017認可批准，多項能力驗證項目取得滿意結果。目前，中藥檢測中心已按國家和國際相關標準完成建設，並於2024年3月啟動試運行，為澳門相關廠商及機構提供中藥檢測服務。

和衷共濟，再上層樓

粵港澳大灣區和橫琴粵澳深度合作區的建設和發展為澳門中醫藥產業帶來新的機遇。澳大肩負澳門中醫藥產業發展的使命，積極把握多項政策帶來的新機。澳門中醫藥發展不僅要整合粵港澳大灣區優質醫藥資源和產業資源，也要充分利用「一國兩制」和「粵澳合作」的優勢，強化創新方藥的研發和產業轉化，推進澳門中醫藥科技產業和中華醫藥國際化發展。

「丹心寸意，皆為有情，和衷共濟，再上層樓。」王一濤教授對澳門的中醫藥大健康產業發展充滿期待。2024年正值澳門回歸祖國25周年，展望未來，他說：「我們一定不負澳門特區政府的囑託和全體市民的期待，建設好澳門中藥研發中心這一嶄新的產學協同共同體，為『澳門研發、澳門註冊、澳門智造、澳門品牌、國際品質』做出我們一份微薄之力。」陳新教授亦表示，研究院和國家重點實驗室多年來在研究、教育和社會服務方面創造了卓越的成績，在國際學術界建立廣泛的聲譽，得益於國家、澳門特區政府和大學的支持，也有賴全體師生勠力同心所作出的貢獻。我們將把握機遇，發揮優勢，為建設更健康的社會作出切實的貢獻。

陳新教授
Professor Xin Chen

From 0 to 1, Pioneering Innovation

In 2002, Professor Yitao Wang was invited to Macao by the then Chief Executive of the Macao SAR, Edmund Ho Hau-Wah, and UM. Since then, he has been deeply involved in the education and industrial development of Chinese medicine in Macao. Over the past two decades, Professor Wang has pioneered an innovative path for talent training, scientific research, R&D translation, and industrial development of Chinese medicine in Macao. He has been a witness, participant, facilitator and contributor to the development of Chinese medicine in Macao. With Professor Wang's planning and organisation, UM set up the Institute of Chinese Medical Sciences (ICMS). Starting from scratch, UM created a system for nurturing international innovative talents. In 2008, Professor Wang led a team to initiate the planning and preparatory work for a state key laboratory and received the approval from the Ministry of Science and Technology in 2010, making it the first state key laboratory in the field of Chinese medicine in China. This Laboratory focuses on a key aspect that limits the industry's development: quality of Chinese medicine. Since its establishment, the Laboratory has been playing a vital role in enhancing the quality of Chinese medicine and setting international standards. In recognition of UM's achievements in this field, the laboratory's research team was awarded the "The Medal of Merit - Professions" by the Macao SAR government in 2021.

At present, ICMS and SKL-QRCM (UM) have formed an international and high-level faculty team, with over half of the members ranking among the top 2% of scientists globally. These experts are capable of seeking innovation by integrating traditional Chinese medicine and modern cutting-edge technology. Moreover, they have international study backgrounds and rich research experiences. ICMS and SKL-QRCM (UM) focus on the efficacy, safety, stability, and controllability of Chinese medicine, and have produced a large volume of research outputs with international recognition.

Yitao Wang is currently a chair professor of ICMS and serves as the Director of the Macao Centre for Research and Development in Chinese Medicine. He states, "Thanks to the support of the central and SAR governments, and the dedication of Chinese medicine practitioners in Macao, the traditional Chinese medicine and 'Big Health' industry has established a solid foundation for development since Macao's handover to China. Time flies! I have been fortunate to participate in the development of Chinese medicine education, technology, and industry in Macao for over 20 years. I still remember clearly that we started ICMS in a student dormitory on the old campus. Step by step, we have pioneered distinctive research in Chinese medicine in Macao. Today, UM has established a world-leading platform for quality research and innovative R&D in Chinese medicine."

A Hub for Training Talents

Since its establishment, ICMS has been dedicated to nurturing modern, international, and interdisciplinary talents in the field of Chinese medicine. It places great emphasis on three key abilities of its students: firstly, the ability to integrate tradition and innovation, focusing on blending knowledge of traditional Chinese medicine with cutting-edge technology; secondly, the capacity for research innovation, highlighting academic breakthroughs and result translation in Chinese medicine; lastly, the capability for international practice, emphasising the interdisciplinary collaboration and a global perspective. Over the past 22 years, ICMS has trained over 1,000 postgraduates, in which more than 30 of them rank among the top 2% of scientists worldwide. ICMS students have consistently achieved first prize in national competitions such as the Challenge Cup and the China Youth Science and Technology Innovation Award. Furthermore, they have received over 40 Macao Postgraduate Research and Development Awards. Many excellent graduates have become key members of ICMS and SKL-QRCM (UM).

Jianbo Wan and Shengpeng Wang are both outstanding researchers in Chinese medicine who are successfully nurtured by UM. They have been honoured with multiple research awards and accolades, and have made significant contributions to Chinese medicine research at UM. Jianbo Wan, a professor and the Programme Director at ICMS, obtained his master's and doctoral degrees in Chinese medicine from UM and was one of the first batch of postgraduate students of ICMS. His primary research covers the quality evaluation of Chinese medicines and metabolomics. He has published over 210 SCI papers, with total citations numbering over 6,600. Professor Wan was awarded for International Award for Contribution to Chinese Medicine-Achievement Award in Medical Science by the World Federation of Chinese Medicine Societies (1st Prize). He has also been listed in the World's Top 2% Scientists for three consecutive years (2020-2023). In addition, he serves as an executive editor for the *Chinese Medicine* journal. While Shengpeng Wang serves as an assistant professor at ICMS, the Deputy Director of the Macao Centre for Research and Development in Chinese Medicine, and the Program Director of SKL-QRCM (UM). During his studies at UM, he received the Macao Science

and Technology Award twice and won the China Youth Science and Technology Innovation Award. He conducts research on the active ingredients in Chinese medicine and innovative Chinese medicine development. He has published over 160 SCI papers, with total citations numbering over 7,200 and an h-index of 46. Professor Wang was listed in Highly Cited Researchers 2023 and included in the World's Top 2% Scientists. He was also recognised by the Youth Support Programme of the Chinese Association of Chinese Medicine. Furthermore, he won a gold award at the International Exhibition of Inventions of Geneva and the International Award for Contribution to Chinese Medicine-Achievement Award in Medical Science (1st Prize) by the World Federation of Chinese Medicine Societies.

Xin Chen serves as the Director and a distinguished professor of ICMS, and the Director of the SKL-QRCM (UM). He emphasises, "UM not only trains numerous outstanding postgraduates but also recruits young local scholars through various talent programmes The University aims to attract outstanding local talents to develop their career in Macao. Within ICMS, 5 out of 39 academic staff members are from Macao."

Making Comprehensive Plans to Go Global

The internationalisation of Chinese Medicine at UM is not only evident in its talent training philosophy but also extends to other aspects. As early as 2013, UM created the international academic journal *Chinese Medicine*, with Professor Yitao Wang serving as the editor-in-chief. Published by the world-renowned publishing company Springer Nature in London, it has gained a strong reputation and influence as an SCI academic journal in the field of Chinese Medicine. In 2022, its impact factor reached 4.9, with a five-year impact factor of 6.0.

2023 年 10 月，澳大舉辦第一屆澳門中醫藥與天然藥物國際研討會暨第一屆澳門藥學國際研討會
UM held the 1st International Symposium on Chinese Medicine and Natural Products and the 1st International Symposium on Pharmaceutical Sciences in October 2023

Professor Wang remarks, "For Chinese medicines to be manufactured, sold and used worldwide, they must have internationally recognised quality standards that define which active ingredients are quality indicators." For this reason, the State Key Laboratory has established joint laboratories with all three regulatory bodies in the US, Europe, and China, namely the United States Pharmacopoeia Convention (USPC), the European Pharmacopoeia Commission (Ph. Eur. Commission), and the Chinese National Institutes for Food and Drug Control. The Laboratory has also set quality standards for more than 20 Chinese medicinal herbs for authoritative publications such as United States Pharmacopeia (USP), European Pharmacopoeia (Ph. Eur.), and Chinese Pharmacopoeia (ChP). The herbs include Panax notoginseng (Sanqi), Mai Dong, Lycium barbarum (Goji), Cordyceps militaris, powders of fermented Cordyceps sinensis, Galangal, Dendrobium officinale, Pogostemon cablin, and Phyllanthus emblica.

Professor Xin Chen states, "UM follows a highly focused and refined path in Chinese medicine. International collaboration is a distinctive feature of the ICMS. With efforts in the past years, we have established a network with over 100 top universities, research institutions, and hospitals worldwide, including Harvard University, Cambridge University, Tsinghua University, and the University of Hong Kong. In recent years, we have also organised various academic conferences and symposiums, including the first International Symposium on Chinese Medicine and Natural Products and the first International Symposium on Pharmaceutical Sciences. In addition, we have hosted a series of invited guest speaker seminars, all aimed at expanding our international collaboration network."

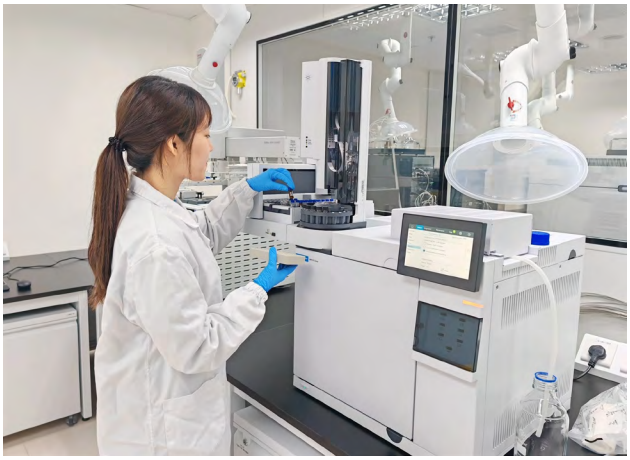
Research Outputs Translation and Industry-Academia Collaboration

In recent years, the SAR government has adopted the "1+4" strategy for appropriate economic diversification to promote four pillar industries including traditional Chinese medicine and the "Big Health" industry. Several important official documents such as "The Second Five-Year Plan for Economic and Social Development of the Macao Special Administrative Region (2021-2025)" and the "Development Plan for Appropriate Economic Diversification of the Macao Special Administrative Region (2024-2028)", has set a detailed path for the development of the traditional Chinese medicine and the "Big Health" industry.

In October 2020, the SAR government approved the establishment of the Macao Centre for Research and Development in Chinese Medicine, the first-ever platform for the translation of innovative R&D results in Macao. The Centre is funded by the Science and Technology Development Fund (FDCT) of Macao, with Professor Yitao Wang serving as the Director. It was jointly established with several pharmaceutical companies listed on the Fortune 500, the Institute of Chinese Materia Medica China Academy of Chinese Medical Sciences and the Hong Kong R&D Centre for Chinese Herbal Medicine Drug Development Limited. The Centre has overseen the research and development of 12 classical prescriptions, 100 formulations of granules, 8 upgrades of famous proprietary medicines, as well as the transfer of more than 10 international formulae of prescription medicines. After three years of endeavour, the Centre has developed into a top industry-academia collaborative innovation hub and a platform for R&D result translation. It has successfully passed the first 3-year assessment in platform development and research project, receiving high praise from expert panels.

To promote the development of Macao's Chinese medicine industry, ICMS has been planning to establish the Macao Centre for Testing of Chinese Medicine, University of Macau (MCTCM) since 2022. The Centre

provides technical support to the Macao Pharmaceutical Administration Bureau, and develop distinctive programmes for Chinese medicine testing. These initiatives aim to offer strong technological support and ensure the development of Macao's Chinese medicine brand. MCTCM is dedicated to the development of the Chinese medicine testing and the verification of Chinese medicine and contributing to the enhancement of the industrialisation and internationlisation of Chinese medicine in Macao. In May 2023, MCTCM received approval for its first ISO/IEC 17025:2017 accreditation from CNAS and achieved satisfactory results in several proficiency tests. Currently, MCTCM has completed its construction in accordance with national and international standards. The trial operation has commenced in March 2024, providing Chinese medicine testing services to manufacturers and institutions in Macao.



澳門大學澳門中藥檢測中心
Macao Centre for Testing of Chinese Medicine, University of Macau

Collaborative Efforts to Reach New Heights

The development of the Guangdong-Hong Kong-Macao Greater Bay Area and the Guangdong-Macao In-Depth Cooperation Zone in Hengqin have brought new opportunities for Macao's Chinese medicine industry. Adopting the mission to develop the Chinese medicine industry in Macao, UM has seized the opportunities presented by the newly implemented policies. Initiatives include integrating the high-quality industrial resources in the Guangdong-Hong Kong-Macao Greater Bay Area, as well as utilising the "One Country, Two Systems" policy and the cooperation between Guangdong and Macao. UM aims to strengthen the R&D of innovative prescription medicines and their industrialisation, and drive the advancement of Chinese medicine science and technology industry as well as the internationalisation of Chinese medicine in Macao.

The year 2024 is the 25th anniversary of Macao's handover to China. "We have been working for the Chinese medicine development with dedication and passion. In the future, I am confident that we will reach new heights through collaborative efforts," says Professor Yitao Wang. He anticipates the development of Macao's traditional Chinese medicine and the "Big Health" industry. Professor Wang also states, "With the trust of the Macao SAR government and the expectation of all citizens, we are committed to building the Macao Centre for Research and Development in Chinese Medicine as a brand new industry-academia community, and contribute to 'Macao R&D, Macao Registration, Macao Intelligent Manufacture, Macao Brand and International Quality.'" Similarly, Professor Xin Chen states, "ICMS and the State Key Laboratory have made remarkable achievements in research, education, and social services, earning significant international recognition over the years. These accomplishments are the outcome of combined support from the country, the Macao SAR government and the University, as well as the collective contributions of our staff and students. We will seize the opportunities and leverage our strengths to make tangible contributions towards building a healthier society."

珠海澳大科技研究院：打造粵澳連接紐帶，構建產學研深度融合

Zhuhai UM Science & Technology Research Institute: Fostering Synergy between Guangdong and Macao, and Strengthening Industry-University-Research Collaboration

文：黃蕾君
Chinese & English Text: Lexie Huang

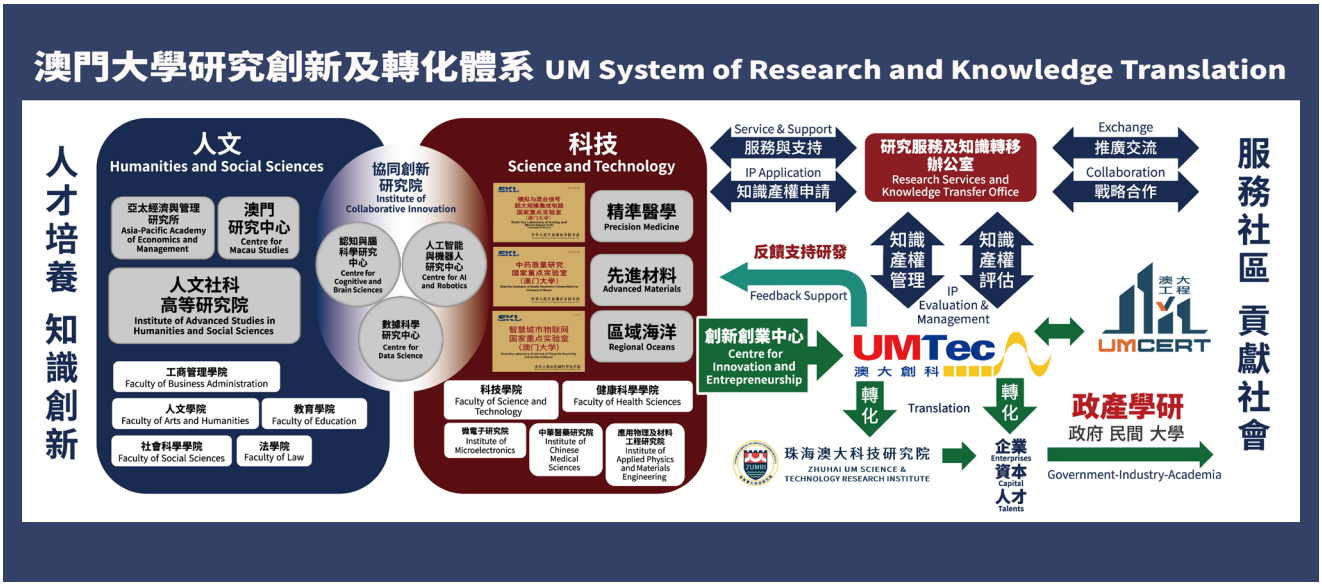
圖：由受訪者提供
Photo: Provided by the interviewee

產學研深度融合是國家創新驅動發展的關鍵戰略，是實現高水平科技自立自強的重要途徑。國家近年來對產學研合作的大力支持，為科技創新機構創造了高質量發展的戰略機遇，譜寫了產學研創新發展的新篇章。

Industry-university-research collaboration plays a crucial role in driving national innovation and development. It serves as a pathway to attain high level technological self-reliance and strength. In recent years, China has actively supported industry-university-research collaboration, thereby creating strategic opportunities for the high-quality development of technological innovation institutions. This has opened a new era of innovation and development for industry-university-research collaboration.

搭建「五位一體」科研成果轉化體系

作為澳門特區的綜合性公立大學，澳大始終以服務國家特別是大灣區高質量發展為使命。為了響應國家的大灣區發展戰略，配合澳門經濟適度多元化，大學一直致力於高水平科研創新，努力推進產學研合作，建立和完善創新、服務、管理、培育及實踐五類平台，搭建了「五位一體」科研成果轉化體系。珠海澳大科技研究院（下稱「珠研院」）的創建正是澳大為融入國家發展、加快產學研轉化的具體實踐。澳大副校長（行政事務）徐建博士表示：「不同功能的平台互相支持、互相促進，充分發揮各自優勢，形成共同生態，有利於提升大學的科研創新能力和產學研合作成效。」



澳門大學研究創新及轉化體系
The UM System of Research and Knowledge Translation

厚積薄發，為產學研轉化而生

珠研院作為產學研實踐平台，正是「五位一體」成果轉化體系最後一環，也是讓科研成果由實驗室走向市場的關鍵一環。珠研院於2019年3月落戶橫琴，旨在推進粵澳地區產學研合作，是澳大成立的首個產學研示範基地。

近年來，珠研院依託澳大優勢學科院所的科研力量，致力於服務國家科技創新事業，促進產學研創新合作與成果轉化，為大灣區培養高端複合科技創新人才，先後被認定為全國博士後科研工作站分站、廣東省新型研發機構、廣東省移動機器人專用芯片工程技術研究中心、珠海市新型研發機構、珠海市中小企業公共服務示範平台以及珠海市智慧城市協同創新發展工程技術研究中心等。

珠海澳大科技研究院
Zhuhai UM Science & Technology Research Institute

科研場地漸成規模

珠研院目前已完成三期科研場地建設、擁有超過8,000平方米科研場地，配備超過人民幣1,000萬元的科研設備，下設微電子、智慧城市、中華醫藥、轉化醫學、先進材料、人文社科共6個研發及研究平台、高級培訓中心，以及先進集成電路設計驗證實驗室等公共服務平台，依託澳門大學模擬與混合信號超大規模集成電路、中藥質量研究、智慧城市物聯網三所國家重點實驗室及優勢學科院所的研究力量，為政府和企業提供多個領域的測試、諮詢和設計服務。

人才引進渠道暢通

依託研究院內博士後科研工作站分站，加之橫琴人才補貼政策支持，珠研院引進澳門大學、上海交通大學、北京師範大學、中山大學、英國曼徹斯特大學、代爾夫特理工大學等國內外知名高校的博士後33人，佔橫琴博士後總人數的五分之一，另有來自集成電路、智慧城市物聯網、生物醫藥領域的澳門大學碩博生於珠研院實習，累計人數超300人。

科研管理基礎紮實

珠研院承接政府及商業項目超過240項，總體金額超過人民幣2億元，包括國家科技部重點研發計劃項目、國家自然科學基金委重大研究計劃集成項目及重點項目、廣東省科技攻關專項項目等。同時，珠研院建立了項目服務、聯合研發、知識產權、企業孵化、轉化激勵，以及財務、人事、設備管理等一系列完善的條例，為科研項目落地實施奠定了堅實的基礎。

腳踏實地，多方位推動高質量產學研合作，賦能高質量發展

珠研院積極促進澳大優秀科研成果落地轉化，構建多種完整、高效的產學研合作落地機制，通過建立創新聯合體促進資源共享、優勢互補，已與超過130家企業、高校院所建立合作關係。珠研院搭建了工業盟友機制，集聚高新產業資源；建設了「澳門大學—華發集團聯合實驗室」，通過澳珠校企深度合作，助力澳門經濟適度多元化發展和珠海產業轉型，現有第一期11個轉化項目在聯合實驗室開展。同時，珠研院積極推進院企聯合實驗室深度融合模式，以教授團隊科研特長為吸引力，引入產業資源，建立直接面向轉化的新型科創平台。

珠研院與多家企業共建聯合實驗室
ZUMRI has established joint laboratories with different enterprises

目前，珠研院已與多家企業共建10餘個聯合實驗室，撬動企業投入金額超過6,000萬元，切實以企業需求為導向，聯合澳大相關領域的優秀科研團隊，共同開展集成電路、生物大健康、智慧城市等重點領域的應用研發，使得成果轉化路徑更順暢，企業獲取前沿技術更高效。

目前，乘木科技聯合實驗室智慧數字孿生平台項目已完成對橫琴島數字建模，並成功模擬上線；一微半導體聯合實驗室移動機器人專用芯片項目應用於家居、商超和園區等複雜動態場景，服務多個國內外知名清潔機器人品牌；華發集團聯合實驗室面向珠澳地區智慧園區的視頻物聯網關鍵技術與應用研究項目已在橫琴創意谷智慧數字園區等實現應用示範。

珠研院代院長兼健康科學學院教授陳國凱見證了珠研院院企聯合實驗室發展歷程。陳教授長期從事人胚幹細胞定向分化、幹細胞代謝調控機制及幹細胞技術開發的研究工作。他負責的皮膚相關項目是澳門大學—華發集團聯合實驗室的首批入庫項目，為創傷修復和護膚品研發提供了新的視角。同時，他作為項目牽頭人與艾爾普再生醫學科技有限公司成立聯合實驗室，聚焦幹細胞技術研發，進一步促進細胞治療產業及生物醫藥的落地轉化。

陳教授對團隊科研成果落地轉化的前景充滿信心，他表示：「兩個項目的順利實施，不僅將促進細胞治療及生物醫藥產業的落地轉化，也可以為疾病研究、新藥開發提供可靠的人源細胞模型及應用材料，為國家重大科研戰略實施提供有力支撐，從而粵澳深度合作發展再添濃墨重彩的一筆。」

陳國凱教授
Professor Guokai Chen

展望未來，粵澳產學研合作前景大有可期

珠研院依託澳門大學優勢學科院所的科研力量，積極發揮着產學研合作的橋樑作用，致力於服務國家科技創新事業。談及珠研院近年推進琴澳兩地產學研合作的歷程，徐建副校長表示：「隨着粵港澳大灣區融合發展向縱深推進，科技要素的互聯互通是各方加強科技合作的基礎。澳大早在數年前就在橫琴設立珠海澳大科技研究院，充分體現了澳大對推進產學研合作方面的重視和誠意。近年來，珠研院充分利用粵港澳大灣區建設優勢和強大的產業配套能力，在開展產學研合作方面積累了豐富經驗，積極促進了澳大的微電子、智慧城市與中醫藥等學科的優秀科研成果從『實驗室』走向『生產線』。」

2023年10月，徐建副校長出席珠研院與廣東電網有限責任公司珠海供電局共建的新型配用電技術聯合實驗室的揭牌儀式，會後她進一步表示：「珠研院將加強科技創新和產業創新對接，不斷激活科技創新資源，提升創新體系效能，提高科技成果轉化和產業化水平，大力推動產業鏈、創新鏈、人才鏈深度融合，增強產業發展接續性和競爭力，以高質量的產學研深度融合協作為大灣區發展做出積極貢獻。」

Establishing a Five-in-One System for Research and Knowledge Translation

As a comprehensive public university in Macao SAR, UM has consistently prioritised its commitment to serving the country, particularly in the context of the high-quality development of the Greater Bay Area. In alignment with the national development strategy of the Greater Bay Area and Macao's pursuit of appropriate economic diversification, UM has engaged with full efforts in advancing scientific research and innovation. To facilitate industry-university-research collaboration, UM has established a five-in-one system for research and knowledge translation. This system includes five platforms: innovation, service, management, incubation, and practice. UM's active integration into national development and collaboration in industry-university-research is realised through the establishment of the Zhuhai UM Science & Technology Research Institute (ZUMRI). Dr. Claudia Jian Xu, Vice Rector (Administration) of the University, emphasises the interdependence of these platforms, stating that they mutually support and enhance one another. Thus, an ecosystem has been formulated by leveraging each platform's advantages, thereby maximising the University's capability in research and innovation, and the efficacy of industry-university-research collaboration.

Driving Industry-University-Research Transfer through Continuous Accumulation

ZUMRI, serving as a platform for industry-university-research practice, maintains an important role in the "five-in-one" system. Established at Hengqin in March 2019, ZUMRI bridges the gap between laboratory research and market application. It stands as the UM's first industry-university-research demonstration base with the objective of fostering industry-university-research collaboration between Guangdong and Macao.

In recent years, ZUMRI has been dedicated to serving the national science and technology sector by leveraging the outstanding research capabilities of the faculties and institutes of UM. It also contributes to fostering collaboration in industry-university-research, and training high-caliber, interdisciplinary, and innovative talents for the Greater Bay Area. ZUMRI has received approval as a branch of the National Postdoctoral Research Workstation. Furthermore, the Institute has been acknowledged as a New Research and Development Institution and the Engineering and Technology Research Centre for Specialised Chips in Mobile Robots of Guangdong Province. At the local level, ZUMRI is also recognised as a New Research and Development Institution and a Public Service Demonstration Platform for Small and Medium-Sized Enterprises of Zhuhai. Furthermore, it serves as an Engineering and Technology Research Centre for Collaborative Innovation and Development of Smart City of Zhuhai.

Growing Research Facilities

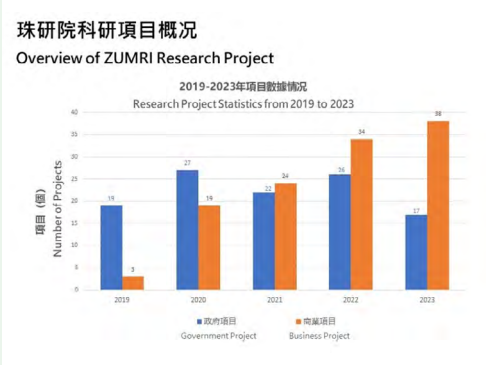
ZUMRI has completed the construction of three phases of research facilities which provide a total research space of over 8,000 square metres. These facilities are equipped with cutting-edge research equipment valued at over CNY 10 million. Six research and development platforms in the fields of microelectronics, smart cities, traditional Chinese medicine, translational medicine, advanced materials, and humanities and social sciences were set up. Additionally, ZUMRI has established an advanced training centre, an integrated circuit design verification laboratory and various public service platforms. Leveraging the research capabilities of UM's three state key laboratories (State Key Laboratory of Analog and Mixed-Signal VLSI, State Key Laboratory of Quality Research in Chinese Medicine and State Key Laboratory of Internet of Things for Smart City), as well as the strengths of its various faculties, ZUMRI offers multiple testing, consulting, and design services to both government departments and enterprises.

Smooth Channels for Talent Recruitment

As a branch of the National Postdoctoral Research Workstation, ZUMRI has successfully attracted 33 postdoctoral fellows from famous domestic and international universities with the support of Hengqin's talent subsidy policies. They have been recruited from UM, Shanghai Jiao Tong University, Beijing Normal University, Sun Yat-sen University, the University of Manchester (UK), and Delft University of Technology. Notably, these postdoctoral fellows represent one-fifth of the total number of postdoctoral researchers in Hengqin. Furthermore, ZUMRI has provided valuable opportunities for more than 300 postgraduate students from UM to engage in internships. These students are majoring in various fields, including integrated circuits, Internet of Things for smart city, and biomedical sciences.

Highly Experienced in Research Management

ZUMRI has undertaken over 240 government-funded and commercial projects, with a cumulative funding amount exceeding CNY 200 million. These projects include a wide range of initiatives, such as national key research and development projects supported by the Ministry of Science and Technology, key projects funded by the National Natural Science Foundation of China, as well as special projects in science and technology development funded by Guangdong Province. To ensure effective implementation of research projects, ZUMRI has formulated a set of regulations related to project services, collaborative research and development, intellectual property, enterprise incubation, technology transfer incentives, as well as finance, personnel, and equipment management.



珠研院於 2023 年承擔科研項目合計 55 項
A total of 55 research projects were undertaken by ZUMRI in 2023

Promoting High-Quality Industry-University-Research Development with Practical Approach

ZUMRI is actively facilitating the translation of outstanding research outputs from UM. It has established several comprehensive and effective mechanisms to foster collaboration between industry and academia. Through forging innovative alliances, ZUMRI promotes resource sharing and capitalises on complementary advantages. Currently, ZUMRI has established partnerships with more than 130 enterprises, universities, and research institutes. The University of Macau-Huafa Group Joint Laboratory is a prime example of university and business cooperation in Macao and Zhuhai which has played a vital role in supporting appropriate economic diversification in Macao and driving industrial transformation in Zhuhai. Currently, the Joint Laboratory is actively conducting 11 projects for translation in the first phase. Furthermore, ZUMRI proactively promotes the deep integration of institute-enterprise joint laboratories, leveraging the research expertise of research teams led by UM professors. By attracting industry resources, it aims to establish a new type of innovation platform focusing on technology transfer.

Currently, ZUMRI has established more than 10 joint laboratories with different enterprises. The funding amount has reached over CNY 60 million. These laboratories join forces with outstanding research teams from UM to carry out applied research and development in key areas such as integrated circuit design, biotechnology, and smart city. This collaboration is oriented to the real demands of the enterprises and create a smoother pathway for research outcomes transfer. It also enables businesses to access cutting-edge technologies more efficiently.

Currently, the smart digital twin platform project, developed in the Joint Laboratory with SyncSmart Co., Ltd, has achieved the digital modelling of Hengqin Island and successfully launched its online model. Additionally, the mobile robot chip project, in partnership with Amicro Semiconductor Co., Ltd, has been applied in various complex and dynamic scenarios, including residential flats, supermarkets, and parks, serving multiple renowned domestic and international cleaning robot brands. Furthermore, in cooperation with Huafa Group, the video IoT project, which focuses on key technology and application in the smart parks in Zhuhai and Macao, has been successfully demonstrated in the Innovalley of Hengqin.

Guokai Chen, Interim Director of the ZUMRI and a professor of the Faculty of Health Sciences, has witnessed the development of joint laboratories with enterprises. Professor Chen has long been engaged in research on lineage-specific differentiation from human embryonic stem cells, metabolic regulation in stem cells, and biotechnology development in stem cells. He is responsible for a project related to skin research, which is one of the first batch run from projects of the University of Macau-Huafa Group Joint Laboratory. This project provides a new perspective for wound repair and skincare product development. Additionally, he has established a joint laboratory with Help Therapeutics Regenerative Medicine Technology Co., Ltd. as the principal investigator. The Joint Laboratory focuses on stem cell technology research and aims to further promote the translation of biomedicine and commercialisation of the cell therapy industry.

Professor Chen is optimistic about the potential of translating his team's research outputs into practical applications. He states, "The successful implementation of these two projects will not only drive the commercialisation and translation of the cell therapy and biomedicine industries but also provide reliable human cell models and application materials for disease research and new drug development. This will offer substantial support for the realisation of national key research strategies and make a significant contribution to the deep cooperation and development between Guangdong and Macao."

Looking Forward: Bright Prospects for Industry-University-Research Collaboration between Guangdong and Macao

Drawing upon the research strength of the faculties and institutes of UM, ZUMRI actively serves as a bridge for industry-university-research collaboration, dedicated to the national science and technology innovation endeavours. When discussing the progress of industry-university-research collaboration between Macao and Hengqin in recent years, Vice Rector Claudia Xu states, "As the development and integration of the Guangdong-Hong Kong-Macao Greater Bay Area continues to progress, the interconnectedness of technological elements has become the foundation for strengthening scientific and technological cooperation among all parties. UM established ZUMRI in Hengqin several years ago, demonstrating its commitment to promoting industry-university-research collaboration. In recent years, ZUMRI has made full use of the advantages of the Guangdong-Hong Kong-Macao Greater Bay Area, especially its strong industrial supporting capabilities. It has accumulated rich experience in carrying out industry-university-research collaboration and actively facilitates the translation of outstanding research outputs in the fields of microelectronics, smart city, and traditional Chinese medicine from the laboratory to the production line."

In October 2023, Vice Rector Claudia Xu attended the unveiling ceremony of the Joint Laboratory for new power distribution technologies, established by the ZUMRI and Guangdong Power Grid Co., Ltd. Zhuhai Power Supply Bureau. After the ceremony, she further expressed, "ZUMRI will strengthen the integration of scientific and technological innovation with industrial innovation and continuously activate scientific and technological innovation resources. In addition, it will enhance the efficiency of the innovation system and improve the level of technology transfer and industrialisation, as well as promote the deep integration of industrial chains, innovation chains, and talent chains. These efforts aim to enhance the sustainability and competitiveness of industrial development and actively contribute to the development of the Greater Bay Area through high-quality industry-university-research collaboration."

徐建副校長（左四）出席珠海澳大科技研究院 - 珠海供電局新型配用電技術聯合實驗室揭牌儀式
Vice Rector Claudia Xu (4th from left) attended the plaque unveiling ceremony of the Joint Laboratory of ZUMRI - Guangdong Power Grid Co., Ltd. Zhuhai Power Supply Bureau in New Electricity Distribution Technology

卓越研究

Excellent Research

初心從未改：為人類的健康事業奮鬥

Staying True to Initial Career Aspiration: Striving for the Healthcare of Humanity

文：黃蕾君、馬文華
Chinese & English Text: Lexie Huang, Martin Ma

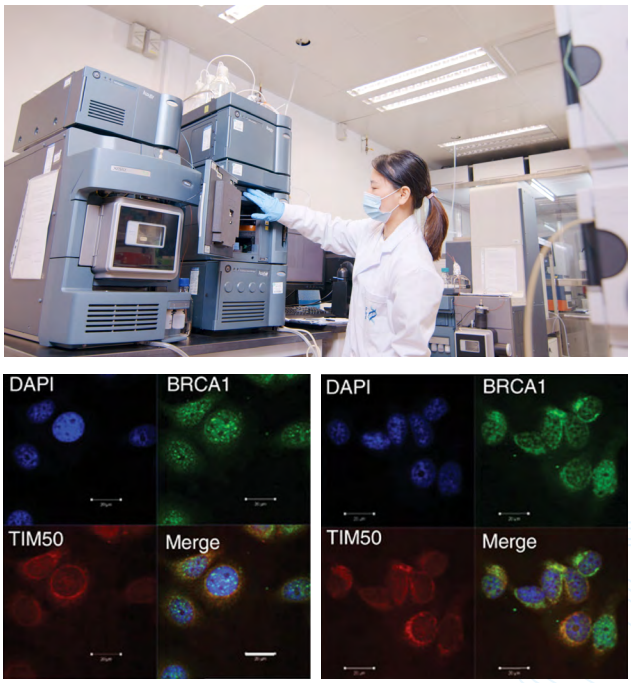
圖：馬文華、部分由受訪者提供
Photo: Martin Ma, partially provided by the interviewee

鄧初夏，現任澳大健康科學學院院長、講座教授兼癌症中心主任。鄧教授於2014年加入澳大，過去十年在他的帶領下，健康科學學院進入了發展的快車道，逐步建立了高水平的科研團隊和教學體系，產出了眾多有國際影響力的科研成果。鄧教授專注於癌基因和腫瘤抑制基因、精準醫學、基因靶向和藥物開發研究，是生命科學領域頂尖的華人科學家。近年來，鄧教授率領的團隊在乳腺癌的發生發展機制和診療上取得了重大進展，不僅成功建立了多種藥物敏感性測試平台，還針對乳腺癌的耐藥和轉移難題，開發精準診斷和個體化治療方案。作為從業數十年的科學家，鄧教授始終保持初心，以研究和解決本地及全球性的癌症問題為己任，為人類的健康事業奮鬥。

Chuxia Deng currently serves as the Dean of the Faculty of Health Sciences (FHS), a chair professor, and the Director of the Cancer Centre of UM. Since joining UM in 2014, Professor Deng has led FHS to make remarkable progress. The Faculty has established a high-level research team and teaching system, and produced a large amount of research achievements with international impact. Professor Deng is a top Chinese scientist in the field of life sciences, with a particular focus on oncogenes and tumor suppressor genes, precision medicine, gene targeting, and drug development. Recently, his research team has achieved significant breakthroughs in the mechanisms and treatment of breast cancer. They have successfully established several drug sensitivity testing platforms and developed personalised therapies for drug resistance and cancer metastasis in breast cancer patients. With a career spanning decades, Professor Deng has stayed true to his original aspiration and is dedicated to studying and addressing local and global cancer challenges for the betterment of human healthcare.

高瞻遠矚的科研佈局

鄧院長以高瞻遠矚的眼光，對健康科學學院的研究方向進行科學佈局。他表示：「我剛來到澳門時，就發現澳門的癌症死亡率非常高，約三分之一的死亡個案是由癌症造成的。那麼我就選定了這個方向，從精準腫瘤學入手。」近年來，特區政府提出採取「1+4」適度多元發展策略，將大健康產業發展放在重要位置。健康科學學院發揮自身優勢，根據澳門及大灣區產業發展需求，逐步明確並建立了10個研究方向，大力引進高層次人才隊伍，配備先進的基礎設施，建立超過40個實驗室，4個研究中心及4個核心實驗中心。2020年，學院更獲國家教育部批准建立港澳地區首個前沿科學中心——精準腫瘤學前沿科學中心，聚焦澳門常見多發腫瘤疾病的前沿科學研究工作。學院致力培養高質量的專業人才，開展本地及國際社會關注的健康科學相關研究，助力澳門經濟適度多元可持續發展及粵港澳大灣區建設。



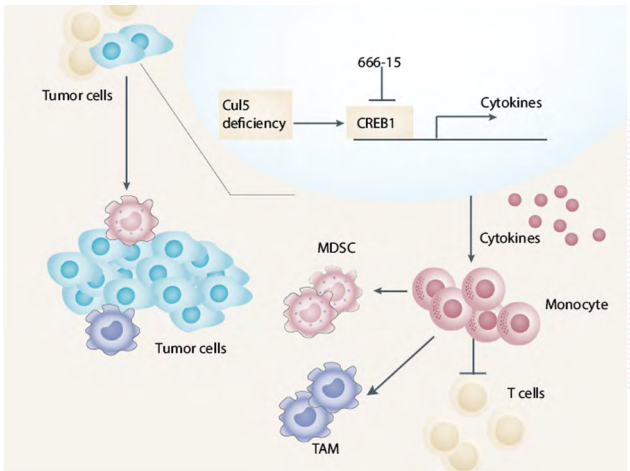
實驗室配備先進的基礎設施
Laboratory equipped with state-of-the-art equipment

高質量的科研成果產出

經過10年的不懈努力，學院在鄧院長的帶領下取得了豐碩的科研成果。10年間，學院組建了40多人的教研團隊，發表了超過2千篇高質量論文，引用次數高達4萬多次，其中相當一部分具有廣泛的國際影響力，此外，還獲批了60多項專利。

健康科學學院在精準醫學、幹細胞和公共衛生三個研究領域的表現尤為突出。在精準醫學領域，鄧教授帶領的研究團隊在腫瘤的發生、發展和治療方面取得了重大進展。相關科研成果在腫瘤研究領域備受矚目，並已獲到多家國際知名期刊刊登。「我們最近的工作是為晚期的高危腫瘤病人找到準確有效的治療方法和用藥，在腫瘤的耐藥方面，我們近年也做了很多研究，並取得了初步成果。」鄧教授說道。

在幹細胞領域，健康科學學院副院長(研究)兼特聘教授徐仁和申報的項目「間充質幹細胞治療移植物抗宿主病等重大疾病的監管和評價的技術體系研究」獲國家重點研發計劃「幹細胞研究與器官修復」立項資助，總資助人民幣 3,000 萬元，是澳大首個牽頭承擔的國家重點研發計劃項目。



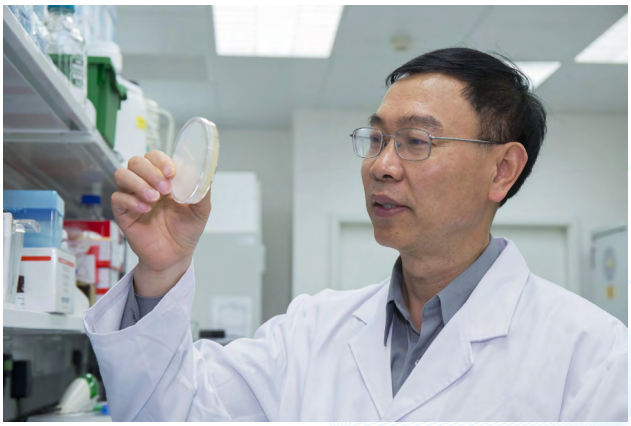
關鍵基因 Cul5 的缺失會加速乳腺癌的生長和惡化
Cul5 deficiency promotes tumourigenesis in breast cancer

在公共衛生方面，健康科學學院教授項玉濤及其團隊就疫情期間各類人群的精神衛生問題撰寫了多篇文章，發表在國際權威的臨床醫學期刊。他指出 COVID-19 疫情期間中國的精神衛生服務面臨新的巨大挑戰，應為有需要的各類人群提供及時的、充分的心理干預，特別是老年人群體，並在全球率先呼籲，要為肺炎患者及衛生工作者、公眾提供及時的精神衛生健康服務。

多層次的人才培養體系

健康科學學院目前建立了3個學系，分別是生物醫學系、藥物科學系、公共衛生及醫藥管理系，並提供三個本科學位課程、三個碩士學位課程和兩個博士學位課程。其中，公共衛生博士學位課程為2024年最新開設，旨在培養具備領導才能的衛生專業人員，包括運用可行的方法和創新思維，將其轉化為特定領域的實際應用，並重點關注人群健康、衛生系統、慢性疾病、以及緊急公共衛生事件的恢復。

在人才培養方面，健康科學學院不僅融合澳大中華醫藥研究院的教學力量，亦為學生提供海內外知名高校的聯合培養機會。目前，學院與浙江大學開展“2+4”聯合培養計劃，成功完成該計劃的學生將獲得澳門大學生物醫學理學士學位和浙江大學臨床醫學學士學位。學院還與貝爾法斯特女王大學聯合開辦“3+2”聯合培養計劃，成功完成該計劃的學生將獲得澳門大學頒授的生物醫學理學士學位，以及貝爾法斯特女王大學頒授的食品科學和營養學士學位。



鄧初夏教授
Professor Chuxia Deng

學院還邀請外部的專家和教授來澳大講學，開闊學生的視野，提供與頂尖專家學者交流的機會。透過優秀的內部教學團隊和豐富的外部資源，學院以啟導學生終身追求知識為己任，形成了多層次全方位的人才培養體系，先後培養了超過650名研究人員和學生。

保持信念感、方向感和好奇心

作為一名國際頂尖的華人科學家，鄧教授享譽海內外。在國際知名學術網站Research.com公佈的2023年頂尖科學家排行榜（Best Scientists Ranking）生物及生物化學範疇中，鄧教授居大中華地區科學家之首，足見其堅實的研究基礎及在國際科研領域的卓越地位。

從業數十載，鄧教授始終堅守自己的初衷和信念，成為一名頂尖的科學家。他認為，作為一名科學家，應當具備三大核心素質：信念感、方向感和好奇心。鄧教授亦分享了自己的故事：「我一直以來的信念就是做一名科學家。一開始我想成為數學方面的科學家，但是大學時誤打誤撞修讀了生物，那麼我就及時調整方向，立志成為生物領域的科學家。選定了自己的方向，就要盡可能做到自己的最好。」他亦認為，做研究，一開始就要做好經常失敗、長期堅持的心理準備。「科學家逃不掉的就是失敗二字，是好奇心讓你面對困難不懼失敗，長期堅持。」鄧教授說。

鄧初夏教授研究團隊
Professor Chuxia Deng's research team

A Visionary Layout for Research Directions

With visionary foresight, Professor Deng, strategically outlined the Faculty's research directions. He states, "When I arrived in Macao, I noticed that the cancer mortality rate was quite high, with about one-third of deaths caused by cancer. Therefore, I chose this direction and started with precision oncology." In recent years, the Macao SAR government has proposed the "1+4" appropriate economic diversification development

strategy, placing significant emphasis on the "Big Health" industry. Leveraging its strengths, FHS has gradually established ten research directions in alignment with the industrial development needs of Macao and the Greater Bay Area. Furthermore, FHS has actively recruited high-level talents, equipped itself with state-of-the-art equipment, and established over forty laboratories, four research centres, and four core facilities. In 2020, FHS obtained approval from the Ministry of Education to establish the first frontier science centre in the Hong Kong-Macao area - the Frontiers Science Center for Precision Oncology, focusing on cutting-edge scientific research on common cancers with high incidence rates in Macao. FHS is committed to nurturing high-quality professionals, conducting health science research of local and international concern, and making contributions to Macao's appropriate economic diversification and sustainable development, and the advancement of the Guangdong-Hong Kong-Macao Greater Bay Area.

High-quality Scientific Research Outputs

Under the leadership of Professor Deng, FHS has achieved fruitful research outcomes with 10 years of dedicated efforts. Over the decade, the Faculty has established an academic team of more than 40 members and published over 2,000 high-quality papers with citations exceeding 40,000. A significant portion of these papers have gained wide international influence. Additionally, FHS has been granted more than 60 patents.

FHS has shown outstanding performance in three research areas: precision medicine, stem cells, and public health. Within the realm of precision medicine, the research team led by Professor Deng has made significant progress in the occurrence, development, and treatment of tumors. Their findings have attracted much attention within the tumor research community and have been published in many internationally renowned journals. "Our recent endeavours have been focusing on identifying precise and efficacious therapies for late-stage patients afflicted with high-risk tumors. We have also conducted extensive research on tumor drug resistance and achieved preliminary results," says Professor Deng.

In the field of stem cells, the project titled "Study of Technical Systems for the Monitoring and Assessment of the Treatment of Graft Versus Host Disease and Some Other Important Diseases with Mesenchymal Stem Cells" submitted by the Associate Dean (Research) and Distinguished Professor Renhe Xu of FHS has been funded by the National Key Research and Development Programme "Stem Cell Research and Organ Repair". This project received a grant of CNY 30 million, making it a debut of UM in the National Key Research and Development Programme.

鄧初夏教授（中）、徐仁和教授（右）和項玉濤教授（左）
Professor Chuxia Deng (middle), Professor Renhe Xu (right), and Professor Yutao Xiang (left)

In the field of public health, Professor Yutao Xiang of FHS and his team have authored several articles on mental healthcare among various populations during the COVID-19 pandemic. These articles have been published in leading medical journals. Professor Xiang pointed out that the COVID-19 outbreak has posed great challenges for China's mental health services. He stresses the importance of offering timely and adequate psychological interventions to those in need, especially the elderly. He also called for global efforts to provide prompt mental healthcare for COVID-19 patients, healthcare workers, and the general public.

A Multi-level Talent Training System

There are three departments in FHS and they are the Department of Biomedical Sciences, the Department of Pharmaceutical Sciences, and the Department of Public Health and Medicinal Administration. FHS offers three undergraduate programmes, two master programmes, and two doctoral programmes. The doctoral programme in public health was newly launched in 2024. It aims to equip health professionals with skills needed in leadership roles, including the use of sound methodological approaches and innovative thinking that can be translated into real-world applications, with a specific focus in the areas of population health, health systems, chronic diseases, and recovery from emergencies with public health consequences.

In terms of talent cultivation, FHS does not only integrate teaching resources of the Institute of Chinese Medical Sciences of UM, but also provides students with opportunities to study at renowned universities outside Macao. Currently, FHS has collaborated with Zhejiang University to implement a "2+4" joint training programme. Graduates of the programme receive a Bachelor of Science in Biomedical Sciences from UM and a Bachelor of Medicine in Clinical Medicine from Zhejiang University. FHS also offers a "3+2" joint training programme in collaboration with Queen's University Belfast. Graduates receive a Bachelor of Science in Biomedical Sciences from UM and a Bachelor of Science in Food Science and Nutrition from Queen's University Belfast.

FHS also invites external experts and professors to UM to deliver lectures. It does not only broaden students' horizons, but also provides students with opportunities for interaction with top scholars. Through an excellent internal teaching team and extensive external resources, FHS has established a multi-level talent training system, guiding and inspiring over 650 researchers and students in the lifelong quest of knowledge.

以色列諾貝爾化學獎得主 Aaron Ciechanover 教授於澳大舉辦的「第二屆澳門生物醫學科學研討會」進行演講
Prof Aaron Ciechanover, a Nobel laureate in chemistry, gave a lecture at the Second Macao Symposium on Biomedical Sciences organised by UM

Maintaining Faith, Direction, and Curiosity

As a world-renowned Chinese scientist, Professor Deng holds a prestigious reputation both at home and abroad. In the arena of Biology and Biochemistry of the 2023 Best Scientists Ranking published by Research.com, a leading international academic website, Professor Deng topped the list among all the Chinese scientists. This achievement showcases his strong fundamentals in the scientific field and his research excellence in the international arena.

Throughout decades of dedication, Professor Deng has stayed true to his original aspirations, becoming a top scientist. He believes that, as a scientist, one should possess three core qualities: faith, direction, and curiosity.

Professor Deng also shared his story, stating, "I have always been driven to become a scientist. Initially, my passion was in mathematics, but I stumbled into biology during my university years by coincidence. Then, I redirected my focus and resolved to become a scientist in the field of biology. Once you have chosen your direction, give it your all." He also emphasises that one should be prepared for frequent setbacks and maintain long-term persistence in research. "Setbacks are inevitable in scientific endeavours. It is curiosity that empowers you to tackle challenges without the fear of failure and persist in the long run," explains Professor Deng.

特色人文：獨樹一幟的澳大語言學研究

Distinctive Humanities: Unique Linguistic Research at UM

文：關詠瑜、馬文華
Chinese & English Text: Christy Kuan, Martin Ma

圖：馬文華、部分由受訪者提供
Photo: Martin Ma, partially provided by the interviewee

徐杰，現任澳大人文學院院長、語言學研究中心主任、孔子學院院長兼中國語言學特聘教授，其學術專長為理論語言學、語法理論、語言規劃與語言教育。徐教授曾於2016年獲選為「語言學及應用語言學」專業範疇唯一一位「長江學者講座教授」，他亦是《澳門語言學刊》主編以及《中國語言學報》聯席主編，在其學術領域具有廣泛的國際影響力。近年來，他帶領澳大人文學院在教學和研究方面取得了長足的進步，令人矚目。

Jie Xu is the Dean of the Faculty of Arts and Humanities, the Director of the Centre for Linguistics, the Director of the Confucius Institute, and a distinguished professor of Chinese Linguistics of UM. His academic expertise lies in theoretical linguistics, grammatical theory, language planning and education. Professor Xu was selected as the only "Chang Jiang Scholar Chair Professor" in the field of Linguistics and Applied Linguistics in 2016. He also serves as the editor-in-chief of the *Macao Journal of Linguistics* and co-editor of the *Journal of Chinese Linguistics*, and has had a wide international influence in his academic field. In recent years, he has led the Faculty of Arts and Humanities of UM to make remarkable progress in teaching and research, attracting considerable attention.

澳大語言學研究：匯聚賢才，別具特色

徐杰教授
Professor Jie Xu

近年來，澳大人文學院積極推動和引領語言學及人文領域相關學科的發展，矢志成為一個有特色、高水平的人才培養重鎮和學術研究中心。學院涵蓋多元廣泛的專業方向，包括文學、歷史、哲學、語言、翻譯、藝術等人文學科領域，而澳大語言學更在學術研究與成果出版方面表現卓越，特色鮮明。

徐教授認為，儘管澳大沒有專門設立獨立的語言學系，但仍以較少的資源成本做出了優異的成績，發揮了最好的效果。這要歸功於來自世界各地分佈於相關系科的一大批傑出語言學家的共同努力。他補充道：「澳大要形成自己的學術特色，不僅要在學術研究和課程結構上與眾不同，還要對學術問題有自己獨特的探索視角。」

帶領澳大語言學「走出去」

澳大人文學院近年的發展勢頭迅猛，這主要得益於其採取的「內外兼修」的發展策略。澳大於2022年成立「語言學研究中心」，有效凝聚不同學系的語言學家，全面推進跨語種的學術協作。中心充分整合現有的研究資源，實現跨學科資源共享，推動跨語種的學術出版，例如《澳門語言學刊》及《中國語言學報》，其中《中國語言學報》就是漢語語言學的頂級期刊之一。此外，作為對外學術交流的窗口和對外學術合作的平台，語言學研究中心組織了多項跨語種的課題合作，經常性舉辦學術會議，並改進網頁設計和內容，強化多媒體信息互動平台，努力帶領澳大語言學「走出去」，擴大在國際學術界的能見度和影響力。

談及令澳大的語言學研究穩步發展、國際地位快速提高的原因，徐教授非常強調團隊建設的重要性。他認為：「人文學院內部的學術氛圍是積極、健康、和諧的，每位教授在這裡都有機會最大限度地發揮自己的聰明才智。作為院長，我能做的就是為大家創造平台，再爭取一些養分，讓同事們自己去盡情發揮，充分施展，讓每個人『都以自己的方式去燦爛』。」

澳大人文學院主辦的刊物
Journals published by the Faculty of Arts and Humanities of UM

徐教授經常以身作則，帶頭組織和參與各種學術活動，為師生們創造平等交流的氛圍，例如「鏡海人文圓桌研討會」、「鏡海語言學圓桌研討會」以及「鏡海學術沙龍」。他冀望通過互動交流，激勵師生們互相學習，努力營造「先進受承認，後進有方向」，你追我趕的學術風氣。「要想方設法提升同事們的士氣和幹勁，能飛就飛，飛不了就跑，跑不動也要邁開大步走起來，絕對不能躺平！只要大家都做好了，整個團隊就自然會好起來！」徐教授強調。

澳門的多語特色為澳大語言學增添色彩

澳門蘊含豐富的語言文化資源，通行多種語言，融合多種文化，擁有獨特的地理位置以及獨有的「三文四語」（三文：中文、葡文、英文；四語：廣東話、普通話、葡語、英語）語言景觀，因此被視為一個「多元文化的鮮活博物館」和「多種語言的天然試驗室」。這使得澳門這片彈丸之地成為研究語言的接觸與變異、不同語言的相互影響的寶地，更為澳大的語言學研究提供了豐富的學術資源和一個世界級樣本。

在澳門這種多語多文化共存的環境下，對於語言教育層面的規劃也是一個極具挑戰性的課題。徐教授指出，語言不僅僅是交流工具，還是人們思考的工具和族群認同的文化符號。思維的深度和廣度決定了人們創新能力的強弱。他提出學生需培養「一超多強」的語言能力，即需有意識地形成一個超強的主導語言，用作思維平台，並配以其他較強的輔助功能語言，以滿足不同場景下的語言交流和情感安頓的不同需要。然而，多語地區的學生普遍存在的問題是主導語言不夠強大，從而影響了他們的思維及創新能力。徐教授認為，語言教育需要有一個綜合性的規劃，以確保學生在語言學習及應用的不同階段有更好的銜接。

澳大舉辦語言文化日以鼓勵學生關注澳門語言及文化多樣性
UM held Language and Culture Day to raise students' awareness of the linguistic and cultural diversity in Macao

「新文科」順應跨學科研究趨勢

「新工科」的概念人們也許並不陌生，但提到「新文科」很多人可能會感到新奇。澳大近年大力推動跨學科研究，打破學科壁壘，鼓勵人文社會科學和現代科技的結合，這與「新文科」概念不謀而合。徐教授認為新文科與傳統文科之間的一個重要區別在於新文科具有跨學科屬性。

徐教授用了十六個字精闢地概括了新舊文科本質上的區別：「入口不同，殊途同歸，各有所長，相得益彰。」他解釋說，相比起舊文科從學理入手，在掌握學理後面對和解決問題。而新文科則從問題和現象入手，從自然界和人類社會中識別和鎖定問題，再尋找合適的理論工具去解決這些問題。如果找得到理論工具，那就用它解決問題，並在解決的過程中爭取改善理論本身。找不到那就直接進行理論創新，自己創造個新理論出來。徐教授強調，無論從哪個入口進來，最終都需要實現學科學理和現象問題的有機對接。

徐教授認為，新文科發展趨勢是自然而然且順理成章的，新文科下的新語言學也不例外。他指出，洞悉現象只是新文科開展的第一步，「始於現象，但不能止於現象。因為任何事物都是有多元屬性的，所以從問題入口的話必然是跨學科的。問題到哪裡，我們的學術研究就要跟到哪裡，不能迴避躲閃，不能畫地為牢。在解決問題的過程中如果遇到知識缺口，研究者就要儘管更新自己的知識結構，或者邀請其他學科的學者參與進來，組建跨學科的團隊來協同解決。比如人文學院積極推動理論語言學研究與現代腦科學的合作，並在神經語言學方面的研究工作已經取得了顯著的成效，令人鼓舞！」徐教授強調，新舊文科應和諧共存，不應互相排斥或厚此薄彼。他表示很期待新文科的理念和實踐能推動澳大語言學事業的進一步發展。

澳大積極舉辦語言學學術研討會
UM actively organises academic conferences on linguistics

Linguistics Research at UM: Gathering Talents and Forging its Own Path

In recent years, the Faculty of Arts and Humanities (FAH) of UM has been actively promoting and leading the development of linguistics and related disciplines in the field of humanities. It aims to become a distinctive and high-level centre for talent cultivation and academic research. The Faculty covers a wide range of disciplines, including literature, history, philosophy, languages, translation studies, and arts. Linguistics at UM has excelled in academic research and publication, showcasing its distinctive features.

Despite not having a dedicated and independent department of Linguistics, Professor Xu said UM has achieved excellent results and doing the best out of it with relatively modest expenditure and few resources. This success is attributed to the collaborative efforts of numerous outstanding linguists from around the world, dispersed across relevant disciplines. “In order to establish its own academic identity, UM must not only differentiate itself in terms of academic research and curriculum structure but also approach academic issues from its own unique perspective,” he adds.

Leading Linguistics at UM to "Go Global"

In recent years, the rapid development of FAH of UM is mainly attributed to its strategy of "internal and external cultivation". UM established the Centre for Linguistics in 2022 to effectively bringing together linguists from different departments and promoting cross-linguistic collaboration. The Centre fully integrates the existing research resources, facilitates cross-disciplinary resource sharing, and promotes cross-linguistic academic publications, such as the *Macao Journal of Linguistics* and the *Journal of Chinese Linguistics*, which is one of the top journals in Chinese linguistics. Furthermore, as a window for international academic exchange and a platform for external academic collaboration, the Centre for Linguistics has organised various cross-linguistic collaborative projects, regularly held academic conferences, and improved its website design and content, and strengthened its interactive platform with multi-media information. These efforts aim to enhance the visibility and influence of UM's linguistics endeavours in the international academic community.

When it comes to the steady growth of linguistics research at UM and the rapid rise in its international standing, Professor Xu emphasises the importance of team building. He believes, "The academic atmosphere within FAH is positive, healthy, and harmonious. Each professor has the opportunity to fully showcase their intelligence and talents here. As the Dean, my role is to create a platform for everyone and strive to provide the necessary support so that colleagues can give full play to their potential and shine in their own unique ways."

澳大語言學研究中心揭牌
Opening ceremony for the Centre for Linguistics at UM

Professor Xu has always set a great example by taking the lead in organising and participating in various academic activities, creating an atmosphere of equality in exchange among teachers and students. Examples of these events include "The Macao Humanities Roundtable", "The Macau Roundtable Symposium on Linguistics", and "The Macao Linguistics Club". Professor Xu aims to inspire mutual learning among teachers and students through interactions, fostering a culture of "recognition for the advanced and direction for the upcoming", where everyone strives to excel academically. "We should find ways to enhance the morale and motivation of colleagues, fly when we can, run when we can't fly, walk when we can't run, and never settle for mediocrity! As long as everyone is doing well, the whole team will naturally thrive!" Professor Xu emphasises.

Multilingualism in Macao Adds Vibrancy to Linguistics at UM

Macao is rich in linguistic and cultural resources. With the prevalence of multiple languages and the integration of various cultures, Macao has a unique geographical location and a distinctive language landscape with three primary written languages (Chinese, Portuguese, and English) and four primary spoken languages (Cantonese, Mandarin, Portuguese, and English), and therefore is regarded as "a living museum of languages" and "a natural laboratory for multilingualism". This makes tiny Macao a precious hub for the study of linguistic and cultural contact and cultural variation, and the interaction and integration of different languages. It provides abundant academic resources and a world-class model for linguistics research at UM.

In a multilingual and multicultural environment like Macao, the planning of language education presents a highly challenging task. Professor Xu points out that language is not only a tool for communication, but also a tool for thinking and a cultural symbol of ethnic identity. The depth and breadth of thinking determines one's ability for innovation. He suggests that students need to develop one super strong dominant language, i.e. they need to consciously form a strong dominant language as a platform for thinking, and it needs to be accompanied by other relatively strong auxiliary languages to meet the diverse linguistic communication and emotional needs in different contexts. However, a common issue among students in multilingual regions is the lack of a strong dominant language, which in turn affects their ability to think and innovate. Professor Xu believes that there is a need for a comprehensive planning of language education to ensure a better articulation of students in different stages of language learning and application.

"New Humanities" in Line with the Trend of Interdisciplinary Research

The concept of "New Engineering" may be familiar to people, but when it comes to "New Humanities", many may find it intriguing. In recent years, UM has embraced the concept of 'New Humanities' by actively promoting interdisciplinary research, breaking down disciplinary barriers, and encouraging the integration of humanities and social sciences with modern technology. Professor Xu believes that an important distinction between "New Humanities" and traditional humanities lies in its interdisciplinary nature.

Professor Xu succinctly captures the essential difference between the old and new humanities in a few words: "Different entry points, converging paths, different strengths, complementing each other for mutual benefits". He explains that while the old humanities approach problems by starting with established theories and then addressing and resolving them, the new humanities start with problems and phenomena, identifying and pinpointing them in nature and human society, and then seek appropriate theoretical tools to address these issues. If suitable theoretical tools can be found, then they are used to address the problems while striving to improve the theory itself in the process. If no tools are found, practitioners of new humanities engage in theoretical innovation and create new theories. Professor Xu emphasises that regardless of the entry point, it is crucial to achieve an organic connection between disciplinary theories and phenomenal problems.

Professor Xu believes that the development of the new humanities, including the field of new linguistics, is a natural and logical progression. He points out that gaining insights into phenomena is only the first step in the development of the new humanities. "Starting from phenomena, but not stopping at phenomena. Everything has multiple attributes, it is necessary to approach problems with interdisciplinary perspectives. Wherever the problems lie, our academic research should follow, without evasion or drawing a line in the sand. In the process of solving problems, if there are gaps in knowledge, researchers should update their own knowledge structures or invite scholars from other disciplines to join and form interdisciplinary teams to collaboratively address the challenges. For example, FAH has been actively promoting collaboration between theoretical linguistics and modern neuroscience, and has achieved remarkable progress in neurolinguistics research. It is truly encouraging!" Professor Xu emphasises that the old and new humanities should coexist harmoniously – they are not mutually exclusive, and we should not prioritise one over the other. He expresses great anticipation for the concepts and practices of the new humanities to further advance the linguistic endeavours at UM.

光纖傳感技術助力港珠澳大橋智能運維

Fibre Optic Sensing Technology Empowers Intelligent Operation and Maintenance of the Hong Kong-Zhuhai-Macao Bridge

文：黃蕾君
Chinese & English Text: Lexie Huang

圖：由受訪者提供
Photo: Provided by the interviewee

周萬歡是現任澳大科技學院副院長(學術事務)、土木及環境工程系系主任，亦是智慧城市物聯網國家重點實驗室(澳門大學) 骨幹成員。她長期從事智慧城市基礎設施安全監測技術及岩土工程災害防治方面的研究工作。多年來，周教授始終保持對科研工作的極大熱忱，產出豐碩研究成果，獲批國家科技部、國家自然科學基金、澳門科學技術發展基金的十多項科研課題；發表高水平學術論文百餘篇，擁有中國發明專利三項、美國專利一項；並於2020年獲批國家自然科學基金優秀青年科學基金 (港澳)。近年，周教授積極推進光纖傳感及人工智能技術的研發，服務跨海基建的運維保養，產生更大的社會和經濟效益。

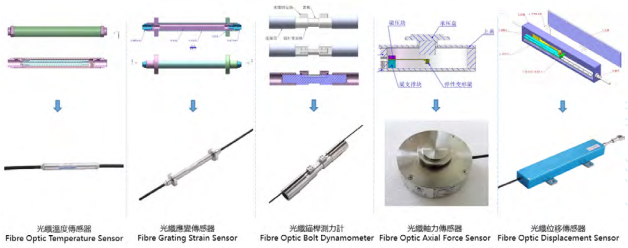
Wanhuan Zhou serves as the Associate Dean (Academic Affairs) of the Faculty of Science and Technology (FST) of UM, as well as the Head of the Department of Civil and Environmental Engineering. She is also a key member of the State Key Laboratory of Internet of Things for Smart City (University of Macau) [SKL-IOTSC (UM)]. Professor Zhou's research focuses on safety monitoring technology for urban infrastructure of smart city and prevention and control of geotechnical engineering disasters. Over the years, Professor Zhou has maintained great enthusiasm for scientific research and produced fruitful outcomes. She has been granted more than ten research projects funded by the Ministry of Science and Technology of China (MOST), the National Natural Science Foundation of China (NSFC), and the Science and Technology Development Fund of Macao (FDCT). She has published over a hundred high-level papers and acquired three China invention patents and one US patent. In addition, she was an awardee of the Excellent Young Scientists Fund (Hong Kong and Macao) in 2020. In recent years, Professor Zhou has been actively engaged in the research and development of fibre optic sensing technology and artificial intelligence technologies to serve the operation and maintenance of cross-sea infrastructure, creating greater social and economic benefits.

致力研究光纖傳感技術

光纖傳感技術是20世紀70年代隨着光纖技術和光通信技術的發展而迅猛發展起來的。目前，光纖傳感技術已被廣泛運用於航天航空、能源環保、工業控制、醫療建築等眾多領域。光纖傳感器以光纖為載體，以光為訊號，具備耐腐蝕、靈敏度高、重量輕、體積小、抗電磁干擾、超遠距離傳輸、便於大規模組網等優點，從而在安全監測領域引起廣泛重視，技術優勢顯著。

周教授帶領研究團隊研發出光纖位移傳感器、溫度傳感器等，已應用於基礎設施及建築結構的安全監測，受到業界的高度認可和好評。周教授的研究團隊在光纖傳感技術研發具有三大核心優勢，其一是傳感結構原理與光纖協同設計，傳感原理合理、測量準確；其二是可靠的光纖封裝技術以及傳感基體的可靠黏合，耐久性好；其三是領先的傳感器數據處理技術，並建立了邊緣計算、智能監測系統平台。

周教授表示：「光纖不單可以用於數據傳輸，還能用來監測溫度和壓力的變化，反映結構受力後的變形特徵。光纖適用於隧道這種比較潮濕的環境，比電子傳感器更耐用。此外，光纖不受電磁干擾，而且具可有串聯特性，能夠提供長距離長期準確的監測數據。」



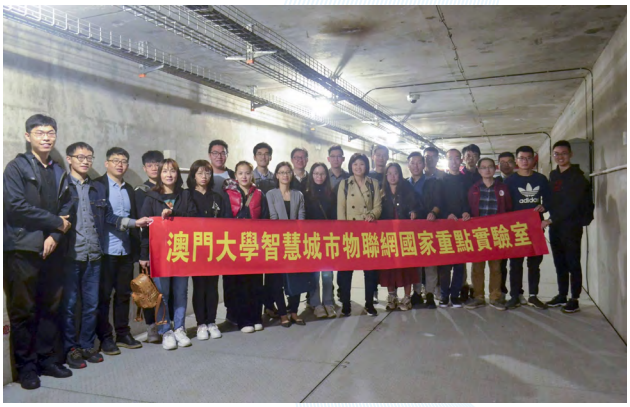
周萬歡教授團隊研發的各類光纖傳感器
Various fibre optic sensors developed by Professor Wanhuan Zhou's team

跨海交通基礎設施智能運維

港珠澳大橋是連接香港、澳門和珠海的大型跨海通道，全長55公里，主橋全長約29.6公里，設計使用壽命為120年。為了給珠江口航道讓出通道，港珠澳大橋主體工程中6.7公里採用海底隧道。這是國內首條外海沉管隧道，採用矩形鋼筋混凝土節段式管節連接，全長由33節管節組成，是當今世界上埋深最大、綜合技術難度最高的沉管隧道。

在複雜濱海環境及極端災害荷載的共同作用下，跨海交通基礎設施的安全運行面臨極大挑戰。周教授團隊積極開展跨海交通基建的智能算法與評估研究，以保障基礎設施安全服役。自2019年起，團隊透過國家重點研發項目「港珠澳大橋智能化運維技術集成應用」和廣東省重點研發項目「重大跨海交通集群工程智能安全監測與應急管控」，與港珠澳大橋管理局及相關單位合作以前沿技術推進大橋的智慧營運、監測和維養。針對島隧薄弱截面、沉管之間易變形位置，研究團隊為大橋開發了「基於光纖光柵的三維變形傳感系統」，結合物理模型、邊緣計算、無線網絡傳輸和大數據智能算法，有效預測和判斷結構的健康狀態。

周教授說：「我們團隊主要負責沉管隧道的長期變形預測和評估，人工島和沉管隧道的連接位置是一個薄弱環節，人工島是相對穩定的，而沉管隧道是半剛性構件。因此，針對人工島和沉管隧道的連接位置，我們特別開發了一個基於光纖光柵的傳感器和一套監測系統，可長期有效地實時監測和判斷沉管結構的變形特徵。」



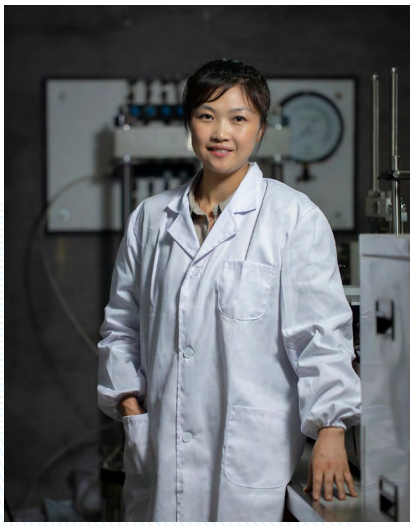
澳大智慧城市物聯網國家重點實驗室研究團隊到港珠澳大橋考察
A research team from SKL-IOTSC (UM) had a field trip at the HZMB

從實驗室到現場工程應用

對於大學的科研團隊來說，將科研成果從實驗室應用到工程現場，是個比較大的挑戰。周教授表示：「我們做科研時，實驗室的環境是相對來說比較可控和理想的，我們通常會遇到的情況是實驗室的效果非常好，但是到現場就不靈了。那麼我們在這個過程中就需要到現場去發現具體問題，做非常多的嘗試。很多時候，團隊都需要在現場找到原因後再回到實驗室修改方案，並不斷地調整計劃，進行更多的嘗試和研究。」

周教授的團隊極具學科交叉特色。研究成員來自機械、工程、光電以及網絡傳輸等各個領域，多元的專業背景為團隊帶來了獨特的優勢和創新潛力。在研究過程中，不同領域的團隊成員之間進行頻繁的交流和溝通，通過分享專業知識，從不同的角度去看待問題，並挖掘關鍵信息。這種跨學科的合作使得團隊能夠將各自的專業知識和技能結合起來，以更全面的方式思考和分析問題，有助於找到創新的解決方案。

周萬歡教授（左）和研究團隊在工程現場
Professor Wanhuan Zhou (left) and her research team at the engineering site



周萬歡教授
Professor Wanhuan Zhou

做研究要注重目標、態度和方法

周教授於2009年加入澳大，回顧這些年在澳大的成長，她深感幸運，「我有幸參與了港珠澳大橋的科研項目，在澳大的平台上，與我的研究團隊成員一起取得了一些有意義的成果。在這個過程中，我們學習了很多，體會到了很多。成功取決於天時、地利、人和。這三個因素，前兩個是我們控制不了的，應該順勢而為。而『人和』則是一個人的綜合實力。」她亦認為，想要做好一件事要把握好三個方面：目標、態度和方法。這三個方面有一定的次序，其中目標是最重要的，它決定了整體架構和最終能達到的高度。態度要端正，不能有投機取巧的想法。方法要科學，要充分利用自己的優勢和資源。

Dedicated to Studying Fibre Optic Sensing Technology

Fibre optic sensing technology emerged rapidly in the 1970s alongside the development of optical fibre and optical communication technologies. Currently, fibre optic sensing technology has been applied in various industries, including aerospace, energy conservation, industrial control and medical buildings. Fibre optic sensors, utilising optical fibre as the medium and light as the signal, have attracted widespread attention in the

field of safety monitoring due to their notable strengths. Advantages of fibre optic sensors include corrosion resistance, high sensitivity, lightweight design, compact size, immunity to electromagnetic interference, long-distance transmission capability, and ease of scalability for large-scale networks.

Professor Zhou's research team has made remarkable strides in developing fibre optic displacement sensors and temperature sensors, which find applications in safety monitoring of infrastructure and building structures. These innovations have obtained significant recognition within the industry. The research team possesses three core advantages in the advancement of fibre optic sensing technology. Firstly, they have achieved a synergistic design of the sensing structure and optical fibre, resulting in a practical sensing mechanism and precise measurements. Secondly, they have successfully combined reliable fibre encapsulation methods with advanced optical fibre packaging technology, ensuring exceptional durability. Lastly, they have pioneered cutting-edge sensor data processing technology, establishing a platform for edge computing and intelligent monitoring systems.

Professor Zhou explains, "Optical fibres have the capability to transmit data and measure temperature and strain changes. These measurements reflect the extent of structural deformation caused by external forces. Fibre optic sensors are suitable for humid environments like tunnels due to their durability compared to electrical sensors. Moreover, their immunity to electromagnetic interference and application in series circuits make them highly reliable for accurate and long-term data collection in long-distance monitoring scenarios."

Intelligent Operation and Maintenance of Cross-Sea Transportation Infrastructure

The Hong Kong-Zhuhai-Macao Bridge (HZMB) is a large sea crossing that connects Hong Kong, Macao, and Zhuhai, with a total length of 55 kilometres. The main bridge is about 29.6 kilometres long, and its designed service life is 120 years. To ensure unobstructed navigation for the Pearl River estuary shipping lane, a 6.7-kilometre undersea tunnel was constructed, becoming the first offshore immersed tube tunnel in China. Rectangular reinforced concrete segmental immersed tubes were used for connection, comprising a total of 33 segments. It stands as the world's deepest-buried and most technologically advanced immersed tube tunnel.

It is challenging to ensure the safe operation of sea-crossing infrastructure considering joint impact of the complex conditions in a coastal environment and the risk of natural disasters. To ensure the safe service of the infrastructure, Professor Zhou's research team has put dedicated efforts to studying intelligent algorithms and assessments for sea-crossing infrastructure. In 2019, they initiated collaborative efforts with the HZMB Authority and other organisations to advance the intelligent operation, monitoring, and maintenance of the bridge with cutting-edge technologies. The team conducted two research projects, funded by the State Key Research and Development Programme and the Guangdong Provincial Key Research and Development Programme, respectively. The national project concerned the application of smart technologies in the operation and maintenance of the HZMB, while the provincial project mainly focuses on smart safety monitoring and emergency control for sea-crossing transportation engineering. By focusing on the vulnerable connections between islands and tunnels as well as the deformable connecting parts among the immersed tubes, the research team developed a 3D deformation sensing system for the bridge, utilising fibre grating technology. By combining technologies such as physical modelling, edge computing, wireless network transmission, and intelligent algorithms with big data, the system can effectively predict and assess the health of different sections of the bridge.

Professor Zhou states, “Our research team is primarily responsible for the long-term deformation prediction and assessment of the immersed tube tunnel. The connection part between the artificial island and the immersed tube tunnel is a critical area. While the artificial island remains relatively stable, the immersed tube tunnel is a semi-rigid structure. To address this, we have developed a fibre grating sensor and a deformation sensing system for the connection area between the artificial island and the immersed tube tunnel. This system allows real-time monitoring of the immersed tube continuously and detect signs of deformation.”

光纖光柵傳感器安裝在港珠澳大橋沉管隧道
Fibre grating sensors installed in the immersed tube tunnel of the HZMB

From Laboratory to On-Site Engineering Applications

For university research teams, translating research findings from the laboratory to engineering sites poses significant challenges. Professor Zhou highlights, “In the laboratory, we benefit from a controlled and ideal environment, which often yields satisfactory results. However, the effectiveness of these results may vary when implemented on-site. It necessitates our team to visit engineering sites, identify specific problems, and conduct numerous trials. Frequently, we must find the causes on-site and adjust our proposals back to the laboratory, continuously refining our plans through further trials and research.”

Professor Zhou’s research team has a highly interdisciplinary composition, with members from diverse fields such as mechanics, engineering, optoelectronics, and network transmission. This combination of expertise provides the team with a distinct advantage and immense potential for innovation. Throughout the research process, team members from different disciplines engage in frequent communication and interaction. By sharing their professional knowledge and viewing problems from various perspectives, they uncover vital information and insights. This interdisciplinary collaboration enables the team to integrate their expertise and skills, fostering a comprehensive approach to problem analysis. It empowers them to think creatively and come up with innovative solutions.

Nurturing Research Excellence with Right Goals, Attitudes, and Methods

Professor Zhou joined UM in 2009. Reflecting on her journey of growth in the University, she considers herself fortunate to have been involved in research projects about the ZHMB. “Together with my team at UM, we’ve achieved meaningful results and gained valuable insights and experiences during the process. Success only happens at the right time, in the right place and with the right people. While the timing and place are external factors beyond our control and we should just go with the flow, ‘right people’ refers to an individual’s comprehensive strength, which is within our reach,” says Professor Zhou. She also believes that to excel in any endeavour, individuals should focus on three aspects: right goals, attitudes, and methods. These three aspects follow a specific order, with right goals being the most important as they define the overall framework and the potential height of individual achievements. In addition, maintaining correct attitudes could avoid the temptation of taking shortcuts. Finally, adopting scientific methods that utilise one’s strengths and resources is also necessary for success.

從數據裡傾聽社會的聲音

Listen to the Voices of Society through Data

文：傳訊部
Chinese & English Text: Communications Office

圖：傳訊部、部分由受訪者提供
Photo: Communications Office, partially provided by the interviewee

「世界這麼大，為甚麼要拘泥於站在特定的領域上去看問題呢？」澳大社會科學學院副院長兼社會學系教授蔡天驥從不為自己的研究設限，其研究領域橫跨犯罪學、行為學、教育心理學等，背後涉及大量交叉學科的眼光和知識。這位在學生眼中是力臻至善的嚴師，如何以嚴謹慎密的計算社會學作為窺視社會問題的「顯微鏡」，傾聽隱藏於數據裡的社會聲音？

"The world is so big. Why should we limit ourselves to one specific area when studying a problem?" Tianji Cai, the Associate Dean of the Faculty of Social Sciences and a professor in the Department of Sociology of UM hardly sets boundaries for himself in research. His research interests cover criminology, behavioural sciences, and educational psychology, all of which heavily draw on interdisciplinary knowledge. In this article, we explore how Professor Cai, a strict teacher who strives for perfection, uses computational sociology as a "microscope" to examine social issues and listen to the voices of society through data.

跳脫框架的研究思維

蔡教授每日都會帶兩罐能量飲品到辦公室，方便一邊做研究一邊喝，「當喝光能量飲品後，我就喝咖啡，現在基本上每天四杯。」這是他在北卡羅來納大學教堂山分校（University of North Carolina at Chapel Hill，以下簡稱UNC-CH）讀書時養成的提神習慣。對他而言，咖啡因未必提升工作效率，但卻是一種投入工作狀態、讓大腦迅速開機的「儀式感」。

蔡教授對數學、統計學情有獨鍾，注重理性思考、邏輯分析，因而尤其善於利用定量分析、數據挖掘、自然語言分析、社會網絡分析等研究方式。他的研究格局從不設框，常強調學科交叉，推進學術思想交融向前，研究領域橫跨犯罪學、行為學、教育心理學等。「結合不同學科優勢開展研究，能更精準說出社會問題的癥結所在。」

蔡天驥教授
Professor Tianji Cai

「世界這麼大，為甚麼要拘泥於站在特定的領域上去看呢？」性格耿直，喜歡說話一針見血的蔡教授在接受訪問時，開門見山地說了這句。「在思考研究問題時，更要超越理論本身。若只是把理論套用於解說社會現狀，那最多就是對此理論的再次驗證。」

鑽研課本沒教的

學習就是一個「滾雪球」積累知識的過程，期間抱着海納百川的胸襟，不斷以新的技術裝備自己，這也是蔡天驥的求學精神。儘管本科在蘭州大學飽讀社會哲學的書，他還是很謙遜認為自己對社會學只是略懂皮毛。於是在2001年，便到北京大學深造，攻讀社會學分支「人口學」碩士課程。哪怕在旁人眼中，人口學是不吃香的冷門專業，入學門檻高（需至少熟悉運用數學語言），就業前景堪虞，尤其當時國家經濟騰飛，他的同學瞄準的是高薪厚祿的專業。但他的求學信念從不動搖，「我想從數學、統計學出發，努力學習新的事物，將社會學的基礎打穩。」

人口學第一道難關，就是編程。蔡天驥當年第一次接觸到SPSS統計系統，當時是第8代（如今已推陳出新至第22代），SPSS的菜單介面（GUI）雖然使用方便，但當時句法語言處理複雜數據的能力，卻遠未如今日這般便捷，而編程教科書更停留在第6代，導致所學未能與時俱進。但他並沒有因此低頭，只輕描淡寫地說了一句，「哎，這個東西挺有意思。」在往後的日子裡，但凡書裡沒有的，他就自己去鑽研。

有一次，蔡天驥的老師要求他幫助分析中國人口普查長表數據，並特意以SPSS代碼計算家庭戶結構，方便學生分析數據，然而當中還有些家庭結構組合無法分出，需要人工檢查糾錯。蔡天驥於是研究了整個晚上，然後在老師基礎上修改代碼，成功將剩下的組合識別，並簡化了整個流程，「老師看到很驚訝，並對我說『這個是你的功勞，這個數據就你可以用。』」從此，蔡天驥開始用人口統計分析，窺探社會結構的變化與制度的更改。

探索基因對人類行為的影響

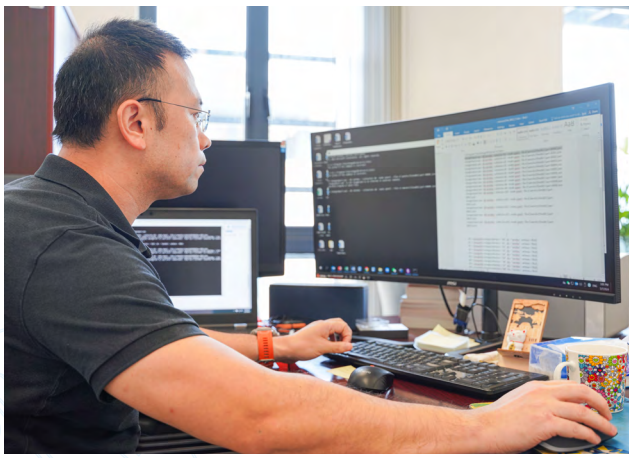
在北大取得碩士學位後，蔡天驥2004年赴美國北卡羅來納大學教堂山分校繼續深造，其後分別取得該校社會學碩士和博士學位。出國前一直研究社會學的蔡天驥，沒想到在UNC-CH深造時，竟然與生物學、遺傳學扯上關係。博士生一年級，他加入由導師主導的探索基因、社會環境相互作用對人類行為影響的研究計劃中，與導師一起將分子遺傳學引入社會學，探索人類行為的奧秘，這為他開了一道新的研究大門。「這類研究當時是非常大膽，因為在第二次世界大戰後，西方社會深信人的行為是受社會文化、學校教育、家庭結構等影響，而絕非先天基因。」

2008年起，團隊開展了一系列基於美國青春期到成年健康行為的前瞻性研究。「我們針對青少年尋找多個性伴侶、暴力傾向，以及濫用藥物、飲酒吸煙等脫序行為的模式進行調查，並證實了當攜帶相對應的特定基因或生物標記，受到生活環境和遭遇的刺激後，會更容易誘發出上述行為。」

踏入21世紀初，基因序列分析技術迅速發展，社會學的行為研究邁上了新台階，讓研究員可以科學手段尋找基因的真相，但也對傳統研究方法提出新的挑戰，例如，如何將海量遺傳資訊納入社會科學模型之中，這亦讓蔡天驥剛掌握的統計學知識大派用場。

結合人工智能技術研究社會學

2013年，蔡天驥回國發展，並應聘到澳大出任社會學系助理教授，開始他在澳門的學術研究生涯。當時，大數據時代開始崛起，他預視到這將為社會學研究帶來翻天覆地的變化，於是開始對深度學習、人工智能、大數據等技術進行摸索，著力把智能技術融入至社會科學的研究中。如今，蔡教授與該學系同儕積極運用基於社會網絡分析、自然語言分析等智能研究工具，推動定量社會研究方法革新，促進計算社會科學的發展。



蔡天驥教授正進行大數據分析
Professor Tianji Cai is conducting big data analysis

蔡教授引用法國意識流作家普魯斯特（Marcel Proust）名句去描述計算社會科學，「真正的發現之旅不在於尋找新大陸，而是以新的眼光去看事物。」他指出，數字技術的發展，讓我們不再局限於用同一雙眼睛看同一片土地，而是用一百雙不同的眼睛去看同一片土地。例如，他曾以澳門有組織性交易作為切入點，透過文本挖掘、人臉識別、圖像分析和網絡分析等技術，揭露了傳統方法難以發掘的社會現象。

另外，蔡教授亦向博士研究生介紹了計算社會學的方法與思路，並帶領他們以自然語言處理技術，開展中國刑事判決書系列研究。目前已完成多個包括新模型應用、量刑影響因素與犯罪模式等內容的子課題，並發表了多篇優質論文，如〈以錢買刑：中國交通肇事罪中賠償對量刑之影響〉〈強姦判決中法官性別的影響〉〈人口拐賣的空間流轉〉等，這些研究探討了中國刑事審判的規律與特徵，對刑事司法研究領域作出了重大貢獻。

蔡教授堅持求變的態度，使他的研究不斷取得成果，至今已有50篇學術論文獲國際期刊刊登，包括《美國社會學評論》、《美國社會學期刊》、《社會學方法論》、《社會科學研究》、《人口學》、《定量犯罪學雜誌》、《當代中國》及《中國社會學評論》等。

在澳門開展社會現狀調查

在蔡教授加入澳大之前，社會學系師生已經注意到，澳門非常缺乏以人口為基礎的經驗數據，這樣會嚴重窒礙許多重大的社會問題研究的開展。有見及此，蔡教授加入社會學系教授李德主導的團隊，與志同道合的師生，如副教授王紅宇、郭世雅等人，在2015年合力開展《澳門社會現狀調查》，並負責其中抽樣、數據整理、加權等技術工作，欲以彌補這方面的空白。

針對一座城市去開展研究，絕非易事，當中需解決的技術難題繁多。「全澳60多萬人口，怎樣的隨機抽樣模式才具準確性、代表性？以團隊有限的人力物力，如何基於家庭戶進行追蹤調查？如何確保蒐集的廣泛數據，能夠建立各項主要社會指標？」蔡教授表示，這些問題都直接關係到研究的信效度，最終影響結論是否成立，因此「調查的每一步，都要走得非常謹慎。」

其時，由於澳門尚未建立一個完善的抽樣系統，蔡教授與團隊成員只好另闢蹊徑。他們先分別從谷歌地圖、百度地圖上，將澳門的建築逐一標記出來。面對全澳各區居住人口數目模糊，他們根據澳門特區政府人口普查的區域，對每棟大廈的信箱判斷住戶數目，沒有信箱的就逐層去數，挨家挨戶地進行調查。團隊的一絲不苟，確保調查結果的可信性。他們採用了多階段分層等比例的方法，抽取了2,600多家住戶作研究樣本，並對3,500多名16歲以上的人士完成單獨面談。

《澳門社會現狀調查》從研究設計到專著出版，前後共花了五年時光，內容涵蓋了澳門的社會分層、移民、家庭轉型、就業、生理與心理健康、成癮和犯罪行為等，是目前澳門學術界最具規模的社會調查，亦在2022年獲頒澳門人文社會科學研究優秀成果著作類二等獎。

《澳門社會現狀調查》獲頒澳門人文社會科學研究優秀成果著作類二等獎
Macao Social Survey received second prize in the publication category of the Outstanding Achievement Awards for Macao Research in Humanities and Social Sciences

高質量的治學追求

對於研究新手來說，最需要的是機會和指導，蔡教授也不例外。他第一篇論文都有過「撞牆」經驗，差點被拒，幸好有審稿人給他機會修改。也許，這是微不足道，但對於在學術圈初出茅廬的他，卻是舉足輕重。因此，他銘記於心，並「助己助人，不求回報」，力所能及提拔後輩。

「蔡教授對研究工作要求很嚴格，每一個用詞、每一位數字，他都會巨細無遺地檢查、修改和校對，不容許任何錯漏。經他指導的論文，多數都會被頂級期刊收錄。」蔡教授的博士畢業生夏一巍說。他們師生合著的論文，曾於全國藥物濫用防治的論文評選中獲得一等獎。如今，夏一巍已為人師，在西南財經大學法學院擔任副教授，並師承一脈，也專門從事定量方法研究。「蔡教授對博士生的指導模式讓我受益匪淺，也被我運用於學生的指導當中。」

由於研究工作需要高度的專注力，這對於眼睛曾受過傷的蔡教授是很不容易，他每20分鐘就要稍歇一刻，但這仍無礙他多年保持高研究質量的治學追求。蔡教授說：「智能計算已經在打破社會科學各學科的邊界，以解釋為主的範式將被替代。我們需要有勇氣比任何人走前一步，創建新的範式，探索如何在精準分析之上對社會問題、現象進行預測。」

Thinking Outside the Box

Every day, Professor Cai brings two cans of energy drinks to his office for consumption while conducting research. “When I finish my energy drinks, I drink coffee. Now I drink at least four cups of coffee a day,” he says. Drinking coffee is a habit Professor Cai picked up when he was a student at the University of North Carolina at Chapel Hill (UNC-CH). He says that caffeine does not necessarily increase his productivity, but drinking coffee is a ‘ritual’ that enables him to get in the groove quickly.

With a strong passion for mathematics and statistics, Professor Cai is good at rational thinking and logical analysis, which helps him to perform research tasks based on quantitative analysis, data mining, natural language processing, and social network analysis. He places no limits on research topics and strives to promote interdisciplinary research in criminology, behavioural sciences, and educational psychology. “By combining the strengths of different disciplines in our research, we are able to get to the heart of social issues,” adds Professor Cai.

A straightforward person, Professor Cai said at the outset of the interview that researchers should not limit themselves to one specific area when studying a problem. “When doing research, we have to go beyond the theory itself. If we just apply the theory to explain a current social situation, we are only validating that theory again,” he adds.

Studying What Is Not in the Textbooks

Learning is a gradual process of accumulating knowledge, and Professor Cai never ceases to acquire new skills. During his undergraduate studies at Lanzhou University, he read numerous books about sociological theories, yet still considered himself to have a rudimentary understanding of sociology. To strengthen his knowledge, he went to Peking University in 2001 to pursue a master’s degree in demography, a branch of sociology that is not

a popular field in the eyes of the public. While the field requires mathematical fluency, it does not lead to great job prospects. China's economy was booming at the time and his classmates aimed for well-paid professions, but Professor Cai never wavered in his academic pursuits. "I wanted to start afresh with mathematics and statistics, acquire new knowledge, and build a solid foundation for my study in sociology," he says.

The first obstacle Cai encountered in demography studies was programming. The SPSS statistical software that he first used was the eighth edition (which has now been updated to the 22nd edition), which was popular for its easy-to-use GUI features. However, its syntax language for handling complex data management tasks was not as sophisticated as it is nowadays, and the programming textbooks available at the time were written for the sixth edition. Even so, Cai did not give up, and just said, "Hey, this is interesting." In the year that followed, Cai studied programming syntax that was not included in the textbook.

On one occasion, Cai's supervisor asked Cai to help analyse questionnaire data collected from the China Population Census and provided SPSS codes for him to identify family structures. However, some types of family structures could not be distinguished, and the result had to be checked for errors and corrected manually. Cai spent the whole night thinking about how to improve the code previously written by his supervisor. He succeeded in identifying the remaining family structures and the changes he made simplified the process. "My supervisor was astonished at the result and gave me access to the data as a reward," said Professor Cai, who from then on began to observe the evolution of social structure and institutional changes through demographic analysis.

Exploring the Influence of Genes on Human Behaviour

After completing his master' s degree at Peking University, Cai entered University of North Carolina at Chapel Hillin (UNC-CH) in the U.S. in 2004 and obtained his master's and PhD degrees in sociology. Always focused on sociology research before studying abroad, Cai had no idea that his academic journey at UNC-CH would lead him to biology and genetics. In his first year of PhD studies, he took part in a research project led by his supervisor and explored how the interaction between genes and the social environment can influence human behaviour. The research project introduced molecular genetics into sociology to explore the mysteries of human behaviour, which opened a new door for Cai. "This kind of research was very bold at that time because, after World War II, Western societies believed that human behaviour was influenced by social culture, education, and family structure, rather than the genes that people were born with," says Professor Cai.

Starting in 2008, the team conducted a series of studies on the health behaviours of individuals from adolescence to adulthood in the United States. "We looked at adolescents' tendency to seek multiple sexual partners, their propensity for violence, and behavioural problems such as drug abuse, alcohol use, and tobacco use. The findings indicate that individuals with specific genes or biomarkers are more likely to show these behaviours when stimulated by their living environment or certain encounters," says Professor Cai.

At the beginning of the 21st century, the rapid development of technology for gene sequence analysis took behavioural studies in sociology to a new level, enabling researchers to use science to reveal the truth about genes. However, it also posed new challenges to traditional research methods, such as the incorporation of a vast amount of genetic information into social science models, and that provided Cai with a great opportunity to apply his newly acquired knowledge of statistics.

Conducting Sociological Research with AI Technologies

In 2013, Cai returned to China to serve as an assistant professor in the Department of Sociology of UM, which was the beginning of his research career in Macao. At that time, big data was taking the world by storm. Foreseeing that would bring radical changes in sociological research, he began to explore technologies such as deep learning, artificial intelligence, and big data, in an effort to integrate smart technologies into research. Currently, Professor Cai and his colleagues in the department are actively using smart research tools for social network analysis and natural language processing, aiming to promote innovation in quantitative methods in sociological research and facilitate the development of computational sociology.

Professor Cai quoted the French writer Marcel Proust to describe computational sociology: "The real voyage of discovery consists not in seeking new landscapes but in having new eyes". He points out that the development of digital technology allows us not to see the same land with the same pair of eyes, but with a hundred different pairs of eyes. For example, with organised sex trade in Macao as an entry point, Professor Cai made use of technologies such as text mining, face recognition, image analysis, and network analysis to reveal social phenomena that are difficult to be discovered with traditional methods.

In addition, Professor Cai introduces his PhD students to computational sociology and guides them in research on criminal judgements in mainland China using natural language processing techniques. He and his students have addressed a variety of sub-topics, including the application of new models, factors influencing convictions, and crime patterns. They have published a number of high-quality papers, such as "Paying Money for Freedom: Effects of Monetary Compensation on Sentencing for Criminal Traffic Accident Offenses in China", "Effect of Judges Gender on Rape Sentencing: A Data Mining Approach to Analyze Judgment Documents", and "Mapping Trafficking of Women in China: Evidence from Court Sentences". Together they have made important contributions to the field of criminal justice by examining the patterns and characteristics of criminal trials in mainland China.

Professor Cai's persistence in seeking changes has led to his continued success. To date, he has published 50 articles in international journals, including the *American Sociological Review, American Journal of Sociology, Sociological Methodology, Social Science Research, Demography, Journal of Quantitative Criminology, Journal of Contemporary China,* and *Chinese Sociological Review.*

Conducting the Macao Social Survey

Before Professor Cai joined UM, faculty members and students in the Department of Sociology had already noticed that the severe lack of empirical data on the Macao population was hampering the development of research on many major social issues. To fill this gap, Professor Cai joined a team led by Professor De Li in the same department and began a survey in 2015 with other like-minded students and colleagues, such as Associate Professors Hongyu Wang and Shih-Ya Kuo. In the project, Professor Cai was responsible for the technical work of sampling design, data collation, and weighting. The results of the survey were later published as *Macao Social Survey.*

Conducting a citywide survey is not an easy task as there are always many technical problems to solve. "Macao has a population of over 600,000. What is the most accurate and representative way to draw a random sample? How can we conduct a household tracking survey with limited manpower and resources? How can we ensure that the large amount of data collected can be used to establish key social indicators? These were some of the issues that we had to address," said Professor Cai, who further pointed out that the issues were directly related to the reliability of the study and would ultimately affect the validity of the findings. For this reason, every single step of the survey had to be taken very seriously.

At the time, Macao did not have a comprehensive sampling system in place. To work around it, Professor Cai and other team members tagged every building in Macao on Google Maps and Baidu Maps. Because the number of people living in each district of Macao was unclear, they counted the mailboxes in each building to determine the number of households in the areas delineated in the Macao SAR government's population census; for buildings without mailboxes, they counted the number of households by going door to door, floor by floor. Their meticulous work ensured the reliability of the final survey results — Using the multi-stage proportional stratified sampling method, the team sampled over 2,600 households and conducted individual interviews with over 3,500 people aged 16 or above.

From research design to publication, it took the team five years to complete the *Macao Social Survey*. The survey covered social stratification, migration, family transition, employment, physical and mental health, addiction, and criminal behaviour in Macao, and is currently the largest social survey conducted in the city. In 2022, the book with the same name received a second prize in the publication category of the Outstanding Achievement Awards for Macao Research in Humanities and Social Sciences.

High-quality Academic Pursuit

What a research novice needs most are opportunities and guidance, and Professor Cai is of no exception. His first journal article was almost rejected, but fortunately, the reviewer gave him an opportunity to revise it. This incident may seem insignificant, but it meant a lot to Cai as a newcomer to academia. Professor Cai has taken this experience to heart and pays it forward, assisting young researchers as much as he can.

"Professor Cai is very rigorous in research. He always makes sure that every single word and figure is used correctly and proofreads meticulously to prevent mistakes. Most of the papers he supervised have been accepted by top journals," said Yiwei Xia, who was a PhD student under Professor Cai's supervision. The paper they co-authored won first prize at a national conference on drug abuse prevention and treatment. Xia is now an associate professor at the Law School of Southwestern University of Finance and Economics, where he also specialises in quantitative research. "I have learned a lot from Professor Cai, and I am now supervising my students in the way Professor Cai supervised me", Xia adds.

Conducting research requires a high degree of concentration, and it has not been easy for Professor Cai, who suffers from eye injuries. He has to take a break every 20 minutes, yet this has not stopped him from maintaining a high quality of research output over the years. "Intelligent computing is breaking down the boundaries of social science disciplines, and the interpretation-based paradigm will soon be replaced. We need to have the courage to be ahead of everyone else and develop new approaches to predict social issues and phenomena through high-precision analysis," says Professor Cai.

蔡天驥教授（右）與其博士畢業生夏一巍
Professor Tianji Cai (right) and PhD graduate Yiwei Xia

無線充電技術產業化：助力智慧城市發展

Industrialisation of Wireless Charging Technology: Contributing to Smart City Development

文：關詠瑜
Chinese & English Text: Christy Kuan

圖：黃蕾君、部分由受訪者提供
Photo: Lexie Huang, partially provided by the interviewee

林智聲，現任澳大微電子研究院及模擬與混合信號超大規模集成電路國家重點實驗室副教授，是土生土長的澳門科研人員。他主力研究及結合電力電子與微電子芯片技術，聚焦電能高效轉換及節能方面的研究，並為澳大培養了眾多優秀科研人員。他曾獲頒2016國際電機及電子工程師學會(IEEE)電力與能源協會(PES)分會傑出工程師獎，為電力工程專業的傑出技術及教育成就作出優秀貢獻，亦曾獲得日內瓦國際發明展金獎、澳門科學技術獎—技術發明二等獎及三等獎。林教授更獲委任為國際著名期刊《IEEE工業電子期刊》副主編，成為至今首位及唯一獲委任的澳門學者。此外，他指導的學生亦曾獲頒多個重要獎項，如第十三屆中國青少年科技創新獎、2022澳門特區政府功績獎狀、第十三屆「挑戰杯」中國大學生創業計劃競賽銀獎、澳門特區政府研究生科技研發獎等。

Chi-Seng Lam is an associate professor of the Institute of Microelectronics and the State Key Laboratory of Analogue and Mixed-Signal VLSI (SKL-AMSV) of UM and is a native Macao researcher. His research focuses on integrating power electronics with microelectronic chip technologies, with a specific emphasis on efficient power conversion and energy-saving techniques. Additionally, he has mentored numerous excellent scientific researchers for UM. Professor Lam was the recipient of the Institute of Electrical and Electronics Engineers (IEEE) Power and Energy Society (PES) Outstanding Engineer Award 2016 for his outstanding contributions to the technical and educational achievements of the power engineering profession, and the Gold Award at the 48th Geneva International Exhibition of Inventions, and Second and Third Prize in the Technological Invention Award category of the Macao Science and Technology Awards.He is currently appointed as an associate editor for the *IEEE Transactions on Industrial Electronics,* making him the first and only scholar from Macao to be appointed to this position. Furthermore, Professor Lam's students have garnered numerous prestigious awards, including the 13th China Youth Science and Technology Innovation Award, the 2022 Macao SAR government Honorific Title of Merit, the silver prize in the 13th Challenge Cup China College Students' Entrepreneurship Competition, and the Macao SAR government Scientific and Technological R&D Award for Postgraduates; among other notable achievements.

「高效易適配」無線充電系統推動智慧城市發展

林智聲教授和高效易適配無線充電系統
Professor Chi-Seng Lam and the Efficient and Adaptable Wireless Charging System

澳門近年來一直致力構建智慧城市，推動智慧交通及低碳出行是重要一環，因此令電動車輛普及化相當重要，此趨勢將為無線充電技術帶來新的市場契機。林智聲教授與研究團隊致力研發的無線充電系統具備高效、易適配的特性，只需一個充電系統即可適配為不同規格的電池充電，更可實現車輛「即停即充、邊走邊充」；而且相比其他無線充電產品，該系統的充電效率更高達94%，加上抗偏移能力強，即使車輛接收能量線圈與充電板的發射能量線圈產生偏移，仍能保持高效充電。該技術能大大提升電池續航能力，並推動低碳出行。

該無線充電系統及技術已獲得一項國內及一項美國專利的授權，以及正在申請六項專利，亦斬獲多個高級別獎項，研究團隊於國際展覽規模最大的第48屆日內瓦國際發明展獲得銅獎，亦於「2022年度深港澳科技項目評審活動」中獲得科技成果一等獎，獲得高度評價。林教授表示，澳大目前的無線充電技術開始受到大眾的關注及認可，並吸引本澳及內地不同的公司和學校尋求合作方向。他認為能獲得如此豐碩的科研成就，離不開澳門特區政府科學技術發展基金、教育及青年發展局及澳門大學的大力支持，以及一眾優秀師生團隊共同努力的成果。

初創企業及產業化的艱辛

澳大近年在特區政府的支持下，致力推動產學研發展，並為初創公司提供起步資助，協助年輕科研團隊結合創意與科技並轉化成實踐。林教授帶領的本地生研究團隊於2019年開展無線充電項目研究，團隊學生於2021年在澳門成立智澳科技有限公司，更於2022年獲入選由澳門大學發展基金會支持建立的澳大第二期「創新創業資助計劃」，起步實現「走向社會，走入市場」。

談及創業的心路歷程及種種艱辛，林教授與研究團隊共同迎難而上，一一攻破難關。林教授憶述第一關是當時初建團隊人手嚴重不足，於是便發掘有潛質的澳門本科生加入，與團隊有經驗的成員共同研究及解決關鍵技術問題；第二關是現實與理想存有落差，為解決充電系統安裝空間有限的問題，團隊需因應實際情境重新研究並改良為非對稱線圈系統，令線圈雖縮小但仍保持高效充電；最後一關是將技術產業化並應用至澳門及大灣區，團隊對於創業和經營公司都是「新手」，所幸澳大創新創業中心具備豐富師資，讓他們可向有經驗的成功人士取經學習。

林教授亦分享了自身對產業化的看法，「科研團隊需清楚了解市場現時定位及發展方向，並檢視團隊的研發技術可否滿足未來產業需求；其次是研發技術必須具有獨特性及不可取代性，方可有機會發展為成功的產業；最後團隊需不斷思考自身科研技術該如何延伸至新領域，以拓展新市場。」

澳大是培養優秀科研人才的搖籃基地

林教授正是澳大培養優秀科研人才的一個成功例子，從本科、碩士、博士到現在從事科研及教學工作，林教授都與澳大並肩同行成長。他認為澳大於培養科研人才上擔當着不可或缺的重要角色，他說：「澳大具備豐富的科研資源和設施配套，令團隊可專注研究科研技術；澳大亦擔當着研究團隊與市場企業之間很好的溝通橋樑，透過澳大研究服務及知識轉移辦公室助力科研成果產業化；而澳大創新創業中心亦為初創公司提供孵化平台，提供多元化的師資、人際網絡及資金支援，協助初創企業走進社會。」

林教授認為澳大目前的整體科研環境十分理想，比他求學時期先進很多，並鼓勵學生更好地運用現有豐富的軟硬件資源從事科研工作。當談及林教授如何成為優秀科研人才時，他謙稱只是一位資深、勤奮且熱愛科研的人員。然而，他認為要培養成功的科研人才，不僅需要學生自身的努力，導師的引導和培養，團隊成員間的互相扶持也非常重要，而且他強調「運氣也很重要，做科研需要天時、地利、人和缺一不可，若果每條路都打通，進行科研工作方會事半功倍。」

林智聲教授與研究團隊所獲獎項
Awards received by Professor Chi-Seng Lam and his research team

勇於發掘千里馬的伯樂

林教授從求學時期到工作都一直致力於科研領域，作為過來人的他深深明白學生於科研路上面臨的困難，他希望能夠以導師身份授予經驗，作為一盞指引明燈，讓學生在科研路上少點碰壁，同時亦希望能夠協助他們規劃未來人生，「讓學生能夠站在巨人的肩膀上，比別人走得更快，並取得更出色的成果。」

「澳大有很多學生都有機會成為千里馬，只差能否遇上那個伯樂。」林教授認為，以往高質量的研究通常僅限於碩士生及博士生才有機會觸碰，若可提早發掘有潛質的本科生，於本科期間加以引導，重點培養他們的科研基礎和興趣，其實本科生亦具備進行高質量研究的能力，這樣方有機會讓他們將興趣變成事業，並繼續在科研領域深造學習。

近年來特區政府正積極推進四大重點產業發展，大力投放資源培養優秀科研人才，促進澳門經濟適度多元，為澳門及國家未來科技發展作貢獻。「科研之門正逐漸敞開，現在是一個很好的契機，讓本澳學生看到高新科技行業邁向一條優秀的出路，以吸引有潛力的學生就讀並投身科技行業。」林教授說道。

“Efficient and Adaptable” Wireless Charging System Promotes the Development of Smart Cities

In recent years, Macao has dedicated substantial efforts to building a smart city, placing significant emphasis on promoting smart transportation and encouraging low-carbon travel. In line with this endeavour, the widespread adoption of electric vehicles holds great importance, and this emerging trend brings forth promising market prospects for wireless charging technology. Professor Lam and his research team have devoted themselves to developing a wireless charging system that possesses high efficiency and adaptability. They have essentially created a single charging system that can be adapted to charge batteries of different specifications. It enables “stop-and-go charging”, allowing vehicles to charge while in motion or during brief stops. Moreover, the charging efficiency of this system is higher compared to other wireless charging products, reaching up to 94%. Additionally, it demonstrates strong anti-offset ability, indicating that even if there is a misalignment between the vehicle's energy receiver coil and the charging plate's energy transmitter coil, efficient charging can still be maintained. This technology has the potential to significantly enhance battery life and promote low-carbon travel.

This wireless charging system and technology has already been granted one mainland China and one U.S. patent, with six additional patents currently under application. Furthermore, the research team has received numerous prestigious awards. They were awarded the Bronze Medal at the 48th Geneva International Exhibition of Inventions, and also the first prize of the Science and Technology Achievement Award in the 2022 Shenzhen-Hong Kong-Macao science and technology project review event, garnering high acclaim. Professor Lam states that the wireless charging technology at UM has begun to gain attention and recognition from the public. It has also attracted interest from various companies and educational institutions in Macao and mainland China, seeking collaboration opportunities. He attributes the fruitful research achievements to the substantial support from the Science and Technology Development Fund (FDCT) and the Education and Youth Development Bureau (DSEDJ) of the Macao SAR government, and UM. He also acknowledges the joint efforts of a team of outstanding teachers and students.

Difficulties of Start-ups and Industrialisation

With the support of the SAR government, UM has been committed to promoting the development of industry-academia collaboration in recent years, as well as providing start-up grants to assist young research teams in combining creativity with technology and transforming it into practice. In 2019, a local student research team led by Professor Lam embarked on a wireless charging project. In 2021, the team established Smarmac Technology Company Limited in Macao. Subsequently, in 2022, they were selected to participate in the second funding scheme for innovation and entrepreneurship supported by the University of Macau Development Foundation (UDMF). As part of the scheme, the team has achieved the goal of entering society and launching on the market.

研究團隊於展覽推廣無線充電技術
Research team promoting wireless charging technology at an exhibition

When discussing the journey and challenges of starting their own business, Professor Lam and his research team highlight various obstacles encountered and share how they have overcome them together. He recalled the initial hurdle of facing a severe manpower shortage during the team' s establishment. To address this, they identified promising local undergraduates to join their team and collaborated with experienced members to conduct research and solve key technical issues. The second challenge they encountered was the disparity between their ideals and the practical limitations. To overcome the limited space for the charging system, the team had to reassess the situation and develop an asymmetrical coil structure that maintained high efficiency in charging despite its smaller size. The last major obstacle was the industrialisation of their technology and its application in the market, specifically in Macao and the Greater Bay Area. As newcomers to entrepreneurship and running a start-up company, they were fortunate to have support from the Centre for Innovation and Entrepreneurship of UM, which enabled them to learn from experienced and successful entrepreneurs, guiding them through the process and providing valuable insights.

Professor Lam also expresses his opinion on industrialisation, stating, "Research teams need to have a clear understanding of the market's current positioning and development direction, and assess whether their research and development (R&D) technologies can meet future industry demands. Secondly, R&D technologies must possess uniqueness and irreplaceability to have the potential for successful industry development. Lastly, teams should consistently contemplate how their R&D technologies can be extended into new domains to expand into new markets."

UM is a Cradle for Nurturing Outstanding Research Talents

Professor Lam is an example of the success of UM in nurturing outstanding research talents. From his undergraduate, master's, and doctoral studies to his current involvement in research and teaching career, Professor Lam has grown alongside UM. He believes that UM plays an indispensable role in nurturing research talents. He adds, "UM provides abundant research resources and facilities, allowing research teams to focus on their scientific and technological research. UM also serves as a bridge for effective communication between research teams and marketplace. Through the Research Services and Knowledge Transfer Office of UM, research outcomes are facilitated in their industrialisation process. Additionally, the Centre for Innovation and Entrepreneurship of UM also provides an incubation platform for start-up companies, offering diverse teaching staff, interpersonal networks, and financial support to assist start-ups in entering society."

Professor Lam believes that the overall research environment at UM is ideal and much more advanced compared to his university days. He encourages students to make better use of the abundant software and hardware resources available for their research work. When it comes to what makes Professor Lam an outstanding researcher, he modestly describes himself as an experienced, hardworking individual with enthusiasm for research. However, he believes that nurturing successful research talents requires not only the students' own efforts but also guidance and nurture from mentors, as well as mutual support among team members. He emphasises the importance of luck, stating that research requires the right timing, favourable conditions, and effective collaboration, and if all these elements are in place, the research work can be accomplished more effectively.

A Talent Scout Discovering Excellent Talents

Professor Lam has dedicated himself to research from his student days to his professional career. As someone who has been through a long research journey, he deeply understands the challenges that students face starting out on their own path. Professor Lam hopes to impart his experience as a mentor, serving as a guiding light to help students navigate the research landscape with fewer obstacles. Additionally, he aims to assist them in planning their future lives, enabling them to stand on the shoulders of giants, move faster than others, and achieve outstanding results.

"Many students in UM have the opportunity to become outstanding talents; it just depends on whether they encounter the right talent scout." Professor Lam believes that high-quality research was typically limited to masters and PhD students in the past. However, if it is possible to identify promising undergraduate students early on and guide them during their undergraduate studies, focusing on developing their research foundation and interests, they could also conduct high-quality research. This approach provides them with the opportunity to turn their interests into careers and continue to pursue advanced studies in the field of research.

In recent years, the SAR government has been actively promoting the development of four key industries and investing substantial resources to nurturing outstanding research talents. This effort aims to facilitate the appropriate economic diversification of Macao and contribute to the future technological development of Macao and the country. "The door to scientific research is gradually opening, and there is now an excellent opportunity for local students to see the promising career prospects in high-tech industries, and for UM to attract potential students to pursue studies and engage in the field of technology." Professor Lam says.

林智聲教授和研究團隊
Professor Chi-Seng Lam and his research team

創新創業

Innovation and Entrepreneurship

協同創新研究院：為交叉研究和創新創業賦能

Institute of Collaborative Innovation: Empowering Interdisciplinary Research and Entrepreneurial Innovation

文：黃蕾君
Chinese & English Text: Lexie Huang

圖：馬文華、部分由受訪者提供
Photo: Martin Ma, partially provided by the interviewee

澳大於2017年成立協同創新研究院，致力於促進澳門、灣區及海內外高校的跨學科研究，培養創新型人才，大力營造有利於「創新思維、創新能力、創新產業」的環境，推動產學研合作。2019年，協同創新研究院下設創新創業中心，支援澳大學生、教職員及校友把具有商業潛力的創新構想轉化成創業項目，讓其「走進社會」以產生經濟效應，把人、技術和產業相互貫通。2020年，創新創業中心獲批國家級眾創空間。迄今，創新創業中心已孵化超過50家企業。

In 2017, UM established the Institute of Collaborative Innovation (ICI) with the aim of fostering interdisciplinary research among higher education institutions in Macao, the Greater Bay Area, and beyond. The Institute is dedicated to nurturing innovative talents, creating an environment conducive to innovative thinking, capabilities, and industries, and promoting industry-university-research collaboration. In 2019, the Centre for Innovation and Entrepreneurship (CIE) was established under the umbrella of ICI. It provides support to UM students, staff, and alumni in transforming their innovative ideas with commercial potential into entrepreneurial projects. This enables them to step into society, generate economic impacts and facilitate the integration of people, technology, and industry. In 2020, CIE gained approval to join China's national system of co-working spaces. To date, CIE has successfully incubated over 50 companies.

推動學科交叉研究

澳大近年來為推動學科交叉研究持續發力，而協同創新研究院的成立和發展為跨學科研究打造了平台。自2017年成立以來，協同創新研究院通過下設的認知與腦科學研究中心、數據科學研究中心、人工智能與機器人研究中心以及澳門轉化醫學創新研究院，推動前沿領域的交叉研究和成果轉化。此外，協同創新研究院還積極開設認知神經科學碩士學位課程和數據科學碩士課程，該系列課程旨在培養能夠深入理解和整合跨學科研究成果、觀點和研究方法的專業人才，推出後反應熱烈，申請人數逐年增加，並獲得社會各界的廣泛好評。認知神經科學碩士學位課程即將迎來首屆畢業生，其中不乏優秀學生留校深造，繼續博士階段的學習和研究。

協同創新研究院代院長須成忠表示：「大學近年形成了“3+3+3+3”的科研戰略佈局，在科研方面走小而精的路線，其關鍵之一就是交叉研究。交叉不僅指科技領域的交叉，亦包括理工學科與人文學科以及生命健康領域的交叉，比如現在研究人工智能是否能具備情感能力，就是一個交叉學科的研究課題。我們近來新加入的幾位非華裔教授，就對人工智能在腦神經科學的應用非常感興趣。通過協同創新研究院的平台，大學整合了相關的研究資源，令澳大師生做一些有針對性，特別是有前瞻性的研究，並取得了非常好的效果。」

協同創新研究院舉辦第一屆跨學科協同創新研究國際研討會
ICI successfully held the 1st International Symposium on Interdisciplinary and Collaborative Innovation Research

促進科研成果轉化

澳大通過多種多樣的方式來促進科研成果的轉化，其一是企業通過委託研究等橫向項目，與澳大的研究團隊進行合作開發；第二個層次是企業和澳大成立聯合實驗室，通過平台來做更大範圍的定向研究；第三個層次是知識產權的轉移轉化，通過將大學的專利以授權許可的方式，將科研成果進行推廣和應用；最後是企業的孵化，所謂孵化，就是為有應用前景的創新技術和想法提供系統的支持以促進其在商業上取得成功，這既包括法律、財務等方面的支持，也包括資源的對接。

須院長介紹到，澳大創新創業中心於2019年成立，主要是起到孵化器的作用，2020年創新創業中心獲得國家級眾創空間的榮譽，這是國家科技部對澳大創新創業工作的肯定和鼓勵。創新創業中心主任梁麗嫻教授表示，創新創業中心目前已成功孵化超過50家初創企業，其中不乏已取得商業成功的明星企業，比如環保麥芽貓砂項目，使用啤酒行業產生的麥芽渣作為植物纖維基底，研發出天然環保、健康高質的貓砂產品，為貓咪提供更優質的貓砂，同時，此產品也為啤酒行業大量麥芽廢棄物所引發的環境問題提供了解決方案。該項目不僅獲得多項創業賽事的獎項，還與廣州九加二創意園投資有限公司簽署戰略合作協定，將產品推廣到粵港澳大灣區。

澳大書院創業團隊——澳門寵物紀元有限公司研發的環保麥芽貓砂
Eco-friendly BSG Cat Litter developed by BioPeTech (Macau) Limited, a company established by a UM entrepreneurial team

「請進來」和「走出去」策略

創新創業中心舉辦多元豐富的活動， 將投資人、創業導師等專業人士「請進來」，亦帶領澳大有意從事創業的師生「走出去」，向創業者、企業界、投資者及公共機構各界展示澳大的產學研成果，搭建溝通的橋樑。

2023年10月，創新創業中心舉辦澳大極創客2023—第二屆澳門大學創新創業展，以「生命科技」為主題，首次聯合澳門科技大學和澳門理工大學，與北京十多所高等院校及醫院共同展出超過70項科技創新項目及初創公司。為期兩日的展覽旨在助力參展科創項目及初創公司對接投資融資商機，吸引了近200名社會各界人士包括投資人、學者及相關從業者到場參觀。

創新創業中心亦積極帶領師生「走出去」，讓澳大的創業者深入了解大灣區青年創新創業發展的機會。2023年11月，創新創業中心主任梁麗嫻教授攜同一眾有志創業的澳大教職員、學生和校友，參訪深圳華為鯤鵬研究中心、深圳灣科技生態園區、華大基因時空中心、騰訊眾創空間（深圳）、香港科技園和數碼港等優秀的高新科技企業和創業孵化中心，讓澳大人深入認識大灣區成功的創業項目和未來發展潛力。

梁教授表示，大學孵化的企業涉及的領域十分多元，包括信息技術、人工智能、大健康以及文化旅遊，這也體現了學科交叉的思維，創新創業中心要做的就是通過提供全方位的支持和服務，助力創業者取得成功。

澳大極創客 2023—第二屆澳門大學創新創業展
The UltiMater 2023 - the 2nd UM Innovation and Entrepreneurship Exhibition

培養創新思維和創業精神

須成忠教授（右）和梁麗嫻教授（左）
Professor Cheng-Zhong Xu (right) and Professor Elaine Lai Han Leung (left)

澳大期望通過促進交叉研究和創新創業營造學以致用的氛圍，鼓勵師生在實踐中培養創新精神，追求卓越，同時也能夠在這個過程中取得成功。須院長強調：「大學教研人員的核心是教學和研究，但是我們也鼓勵大家有餘力的情況去嘗試跟企業合作，把自己的研究成果從實驗室走向產業。其實創業並不簡單的，我們也不是說每一項技術的落地都一定會成功，但是我們鼓勵澳大師生在這個過程中培養開拓精神。」梁教授亦表示：「大學培養創新文化和學以致用的氛圍，其實在於引導青年人去開拓商業思維和創新精神，我們也希望在澳門回歸祖國 25 周年之際，更有效促進澳門產業發展，為大灣區青年開闢廣闊的成長和事業發展空間，以達至『為青年計、為澳門劃、為灣區書』。」

Promoting Interdisciplinary Research

In recent years, UM has made continuous efforts to promote interdisciplinary research, and the establishment and development of ICI has created a platform for such research. Since its establishment in 2017, ICI has been promoting interdisciplinary research and knowledge transfer in cutting-edge fields through its subordinate units. These units include the Centre for Cognitive and Brain Sciences, the Centre for Data Sciences, the Centre for Artificial Intelligence and Robotics, and the Macau Institute for Translational Medicine and Innovation. In addition, ICI offers two master's degree programmes, namely Master of Science in Cognitive Neuroscience and Master of Science in Data Science. These programmes are designed to nurture professionals who possess a deep understanding and integration of interdisciplinary research findings, perspectives, and methodologies. Since their launch, they have received a strong and positive response, with a growing number of applicants each year. They have also garnered wide acclaim from various sectors of society. The master's degree programme in cognitive neuroscience is soon to witness its first batch of graduates, many of whom are exceptional students opting to pursue their doctoral degrees within UM.

Cheng-Zhong Xu, Interim Director of ICI, states, "In recent years, UM has formulated a '3+3+3+3' strategic research layout and adopted a highly focused and refined path in scientific research. A key element in this strategy is the emphasis on interdisciplinary research. Interdisciplinarity goes beyond just the intersection of scientific fields. It also includes the integration of natural science, social sciences and humanities, and life sciences. For instance, a hot research topic that explores whether artificial intelligence can possess emotional capabilities presents its interdisciplinary nature. Recently, UM has recruited several professors from non-Chinese backgrounds. They have displayed a strong interest in the application of artificial intelligence in neuroscience. Through the platform provided by ICI, UM has successfully integrated relevant research resources, enabling our students and staff to conduct targeted and forward-thinking studies, resulting in excellent outcomes."

Facilitating Translation of Research Findings

UM employs a diverse range of methods to facilitate the translation of research findings. One approach is through collaborations with companies on commissioned research projects. This enables research team from the University to work closely with industry partners to conduct research and development. Another channel involves establishing joint laboratories with enterprises, creating a platform for conducting more focused and extensive research. Additionally, UM actively promotes the transfer and commercialisation of intellectual property. By licensing the University's patents, research findings can be promoted and applied more widely. Lastly, UM provides comprehensive incubation support for entrepreneurs. This involves offering systematic assistance to innovative technologies and ideas with promising commercial potential. Through this support, entrepreneurs receive guidance in areas such as legal and financial matters, as well as resource alignment.

Professor Xu explains that CIE of UM has been serving as an incubator since its establishment in 2019. In recognition of UM's remarkable efforts in the field of innovation and entrepreneurship, CIE was honoured as a national Co-working Space in 2020 by the Ministry of Science and Technology of China. Professor Elaine Lai Han Leung, Head of CIE, states that CIE has successfully incubated more than 50 start-ups, including several star companies that have achieved notable commercial success - one such example is the BioPeTech Eco-friendly BSG Cat Litter project. This project uses spent grain generated by the beer industry as a plant fibre base to develop a natural, environmental-friendly, healthy, and high-quality cat litter product. At the same time, the product also provides a solution to the environmental problems caused by the large amount of malt waste in the beer industry. Furthermore, the project won several awards in various entrepreneurial competitions, and a strategic cooperation agreement was signed with OVO PLUS Incubator in Guangzhou to expand the product's reach to the Guangdong-Hong Kong-Macao Greater Bay Area.

"Bringing in" and "Going out" Strategies

CIE organises various activities to "bring in" investors, entrepreneurial mentors, and other professionals to UM. At the same time, it also organises "goes out" events and tours with students and faculty members interested in entrepreneurship. These activities showcase UM's industry-university-research achievements to entrepreneurs, the business community, investors, and public institutions, thereby building bridges of communication.

In October 2023, CIE held the UltiMater 2023 - the 2nd UM Innovation and Entrepreneurship Exhibition, with the theme of "Life Science and Technology". It marked a milestone as CIE collaborated with the Macau University of Science and Technology, the Macao Polytechnic University, and more than ten other higher education institutions and hospitals in Beijing. With over 70 technological innovations and start-ups on display, the two-day exhibition aimed to support the participating projects and start-up companies in forging partnerships and seizing investment and financing opportunities. It attracted nearly 200 investors, scholars, and professionals to the exhibition.

CIE also actively "goes out" with students and faculty members to explore development opportunities within the Greater Bay Area. In November 2023, Professor Leung led a group of aspiring entrepreneurs from UM, consisting of UM faculty members, students, and alumni, on a tour to renowned high-tech enterprises and entrepreneurial incubation centres in Hong Kong and Shenzhen. The tour encompassed visits to famous establishments such as

Huawei Kunpeng Research Centre, Shenzhen Bay Science and Technology Ecological Park, BGI Genomics, Tencent WeStart (Shenzhen), Hong Kong Science and Technology Park and Hong Kong Cyberport. This tour provided UM participants with an in-depth understanding of successful entrepreneurial projects and future development potential in the Greater Bay Area.

Professor Leung states that the incubated companies from UM cover a wide range of fields, including information technology, artificial intelligence, healthcare, and cultural tourism. This diversity reflects the interdisciplinary thinking. CIE's objective is to provide comprehensive support and services to empower entrepreneurs to achieve success.

梁麗嫻教授率澳大團隊到大灣區取經
Professor Elaine Lai Han Leung led a UM entrepreneurship tour to the Greater Bay Area

Nurturing Creative Thinking and Entrepreneurship

UM is committed to creating an environment that promotes interdisciplinary research and innovation while fostering a culture of practical application. The University encourages its staff and students to embrace an entrepreneurial mindset, pursue excellence, and strive for success during this process. Professor Xu emphasises, "Although the primary focus of the academic staff is on teaching and research, we also encourage them to explore collaboration opportunities with businesses. This helps bridge the gap between their research outcomes and practical applications in the industry. While entrepreneurship can be challenging and not every technology transfer would succeed, we encourage teachers and students to maintain a forward-thinking mindset throughout the entire process." Professor Leung further expresses, "The aim of cultivating a culture of innovation and practical application in the University is to guide young people in embracing a business mindset and nurturing an innovative spirit. To celebrate the 25th anniversary of Macao's handover to China, UM also strives to promote Macao's industry development and open a broad space for the growth and career development of young people in the Greater Bay Area. Our ultimate objective is to contribute to planning for the youth, planning for Macao, and contributing to the development of the Greater Bay Area."

澳大孵化企業

UM Incubated Companies

奧正醫療有限公司
AW Medical Company Limited

蓓涞生物科技有限公司
Baylifetech Biotechnology CO., LTD.

卒明健康有限公司
Brainlightening Health Company Limited

看透你科技有限公司
Catydid Technology LTD.

塵心健康科技有限公司
Chasing Health Techonology CO., LTD.

澳門松草堂生物科技有限公司
Cordyceps Plus Biological Technology (Macau) CO., LTD.

晶視野生物科技有限公司
Crystal Vision Biotechnology Limited

金創克有限公司
Genetrump CO., LTD.

華藥精創研究院有限公司
Institute of Chinese Medical Innovation CO., LTD.

澳門芝寶健康科技有限公司
Macau Chiherbal Health Technology CO., LTD.

澳門合安香療應用研究院有限公司
Macau Hap On Aromatherapy Application Research Institute CO., LTD.

澳門盈福生物醫藥有限公司
Macau Informed Biomedicine Company Limited

澳門光學科技有限公司
Macau Optics Technology Company Limited

澳門智慧醫療設備科技公司
Macau Smart Medical Equipment and Technology Limited Company

澳門超科生物醫藥有限公司
Macau Suprascience Biomedicine CO., LTD.

RJC 生物科技有限公司
RJC and CO Biotech LTD.

天鎂科技有限公司
TMASS Technology Company Limited

優覓生物技術有限公司
Umunity Biotechnology CO., LTD

阿法特科技有限公司
Alphatech Technology CO. LTD.

為我創造有限公司
Beme Creation Limited

澳門拍著吃有限公司
Bideats Macao Limited

澳門寵物紀元有限公司
BioPeTech Macau CO., LTD.

區塊鏈數據研究中心有限公司
Blockchain Data Research Center Limited

伯樂未來信息技術服務有限公司
Botofuture Information Technology Service Company Limited

樂送科技有限公司
Deliver2U Tecnologia Sociedade Unipessoal LDA.

澳特朗能源科技有限公司
Faraday Energy Technology CO., LTD.

金果果科技有限公司
Gin Go Go Technology CO., LTD.

連創科技（澳門）有限公司
Leadtech (Macau) Technology CO., LTD.

澳門數字時代有限公司
Macao Digital Era, LTD.

澳門珍禧投資有限公司
Macao Pearl Jubilee Investment Company Limited

澳門澳力信科技有限公司
Macau Aolisin Technology Limited

澳門雲曠科技有限公司
Macau Cloud Time Technology CO., LTD.

澳門可依科技有限公司
Macau Keyi Technology CO., LTD.

澳門 TRUE CARE 科技有限公司
Macau True Care Technology CO., LTD.

澳門雲潮未來科技有限公司
Macau Yunchao Future Technology CO., LTD.

南嘉智造有限公司
Nan Jia Zhi Zao Limited

OSUN 能源科技有限公司
Osun Energy Technology CO., LTD.

印蕉（澳門）有限公司
Printing Banana (Macau) Company Limited

智澳科技有限公司
Smarmac Technology Company Limited

智文有限公司
Smart Fusion LTD.

智管科技有限公司
Smart Guan Technology Company Limited

優創譯科技有限公司
Utran-i Technology LTD.

澳萊特能源科技有限公司
Wright Energy Technology CO., LTD.

楊博科技投資有限公司
Yang Bo Technology Investment CO., LTD.

姚錢樹（澳門）有限公司
Yao Qian Shu (Macao), Limited

紫電科技有限公司
Zidian Technology CO., LTD.

2048 (澳門) 有限公司
2048 (Macau), Limited

魔方文化創意有限公司
A-Cube Cultural & Creative Company

起躍創科設計有限公司
Barra Creative Technology and Design Limited

故事不死有限公司
Eternal Story Cultural Creativity, LTD.

深圳市格氛生物科技（澳門）有限公司
Shenzhen Geffin Biotechnology (Macau) Limited

南國優創工作室有限公司
Southern Utron Studio Company LTD.

人才培養
Talent Development

研究生院院長王百鍵：培養高端人才的秘訣

Dean of the Graduate School Pak Kin Wong: The Secret to Nurturing High-End Talents

文：關詠瑜
Chinese & English Text: Christy Kuan

圖：黃蕾君、趙怡瑋、部分由受訪者提供
Photo: Lexie Huang, Eva Zhao, partially provided by the interviewee

王百鍵，現任澳大研究生院院長兼科技學院機電工程系教授。王教授為澳門土生土長的科研人員，他一直致力於研究汽車工程、流體傳動與控制、機械振動、及人工智能於醫療上的應用等。王教授亦擔任研究生院的管理者角色，致力為澳門大學培養高端研究人才，並參與教研工作，現正帶領十多個博士研究生，當中包括聯合培養博士生及國際生。王教授現時也是香港學術及職業資歷評審局的課程評審專家，對於課程質量控制有相當的經驗。

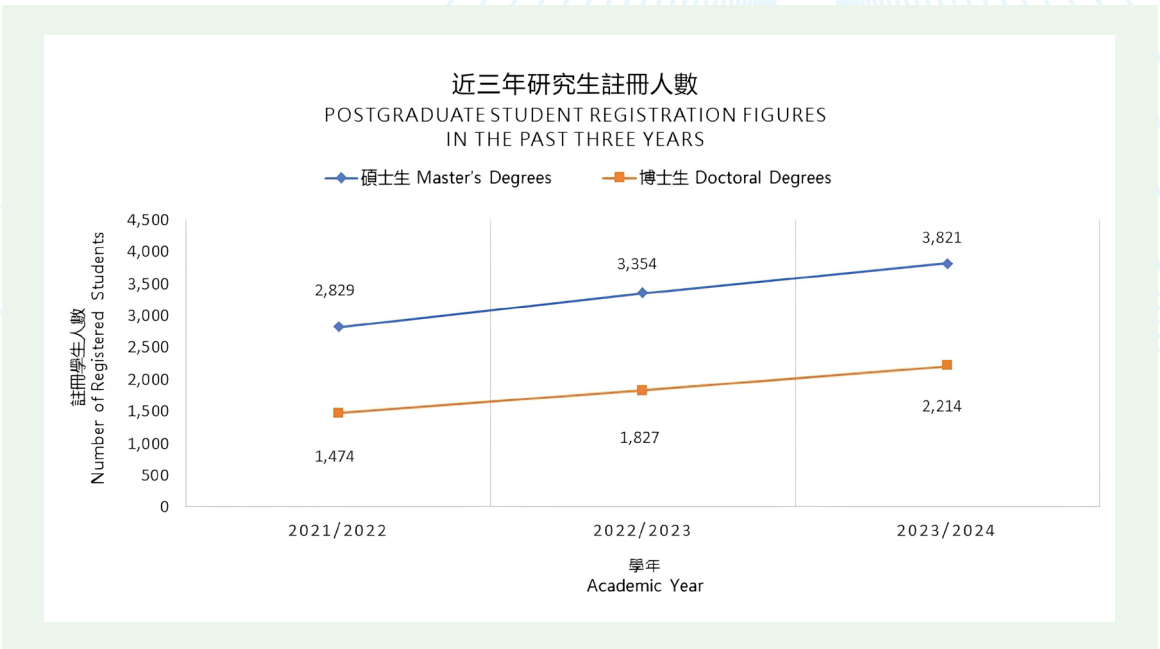
Pak Kin Wong is the Dean of the Graduate School and a professor in the Department of Electromechanical Engineering of the Faculty of Science and Technology of UM. Professor Wong is a native Macao researcher who has been dedicated to studies in automotive engineering, fluid power transmission and control, mechanical vibration, and the application of artificial intelligence in healthcare. He also plays a managerial role at the Graduate School, striving to nurture high-end research talents for UM and participating in teaching and research activities. He is currently supervising over ten doctoral students, including PhD joint programmes students and international students. Professor Wong is also a programmes accreditation specialist for the Hong Kong Council for Accreditation of Academic and Vocational Qualifications, with profound hands-on experience in programme quality assurance.

新穎多元跨學科課程：吸納各地優秀人才

近年，澳大持續優化學科，增設不同領域的研究生課程，並融入高度跨學科項目建設，如數據科學及金融科技等相關碩士學位課程，以鼓勵研究生進行跨學科研究，促進創新和知識交叉；並且不斷探索以往澳大未曾開設的新穎學科，如即將開設的藝術、公共衛生及智慧海洋技術相關研究生課程，進一步發展多元化學科研究，致力培養四大產業高端人才，推動澳門經濟適度多元發展。

隨着社會需求不斷提升，澳大適時擴大研究生規模，並以持續提高生源質量為目標，通過推出一系列獎助學金計劃，如澳大博士生獎學金及博士生教研助理資助，以吸引國內外一流學府的優秀學生入讀哲學博士課程；更設立「澳門大學理工科課程獎學金」，吸引本地專才入讀理工科範疇的碩士學位課程，培養澳門及鄰近地區新興產業所需的研究人才。王教授表示：「設立本地專才獎學金對招生有一定幫助，但仍需要時間觀察成效，我們期望在學生畢業後，通過口碑推薦來吸引更多本地人才選擇澳大為求學之地。」

身為研究生院院長的王教授亦認為，澳大研究生院在招攬研究生人才，管理研究生課程及學術事務，以及協助推進多元學科發展等方面，扮演着重要的角色。研究生院一直致力於協助各個學術單位開設及修訂課程，並通過跨研究領域合作及多元化學科，在培養人才方面發揮着關鍵作用。



近年研究生註冊人數持續攀升
Number of registered postgraduate students is rising constantly in recent years

博士生聯合培養項目：拓展研究合作，提高生源質量

澳大近年積極與各地院校進行教育和科研合作，其中包括與中國科學院（簡稱「中科院」）下屬的研究所和內地知名院校開展博士生聯合培養課程。參加聯培課程的學生不僅可以體驗跨地域教育及多樣化的跨學科，畢業後更有機會到頂尖高等院校從事博士後研究工作。目前，澳大已經培養了77名聯培生。

姚亮是王教授指導下的第一位優秀聯培畢業生，他參加了澳門大學和中國科學院深圳先進技術研究院的博士生聯合培養課程。這個聯培課程為他提供了獨特的經歷和寶貴的機會。姚亮表示：「通過在澳門大學和中科院的聯合培養，我能夠同時享受澳門大學和內地提供的資源。在澳門大學，我可以面向國際發展，在中科院，我可以更多地關注內地，特別是粵港澳大灣區，這擴大了我的視野。同時，我還有機會參與國家重點項目，從而大幅提升了我的綜合能力。」

王百鍵教授（左），中科院導師胡穎（右）和聯培畢業生姚亮（中）
Professor Pak Kin Wong (left), CAS Supervisor Ying Hu (right), PhD joint programme graduate Liang Yao (middle)

儘管聯培課程的入學門檻較高，但這個聯培課程為姚亮畢業後提供了光明的前景。姚亮表示，由於澳門大學、中科院和香港中文大學的團隊已建立了合作關係，所以他將前往香港中文大學進行博士後工作，並繼續從事醫療機器人相關研究。

王教授認為聯培生項目對於澳大的科研發展非常重要。他表示：「澳大與中科院在研究經驗及資源設備方面各有所長，如果雙方攜手合作，相互補充優勢，就可以加快合作研究進度，並拓寬合作研究領域的多樣性。這將有助於吸引更多高水平的研究生，大大提高生源質量，並促進兩校後續合作發展。」

為了持續吸納優秀的高端人才，王教授坦言需要與大灣區的許多大學競爭。他希望透過聯培生項目與多方院校合作，為澳大科研人員爭取機會，接觸更多學術界、工業界和醫療界三方面的資源。未來，澳大將積極發展與海外及葡語系國家的聯培計劃，拓展國際生源，推動澳大的國際化發展。

培養人才的秘訣：關鍵在於注重細節與有效溝通

王教授對學術的要求非常嚴謹和細緻。他將當年導師的仔細指導方法延續至今，每一位學生的論文，他都會親自批改每個句子及每個字。他指導的聯培畢業生姚亮形容，王教授使他從最初還能容許自己犯一些微不足道的小錯誤，到現在細緻入微到每一個標點符號都要字斟句酌，這正是從王教授身上學習到作為科研人員所應具備的正確素養。

王教授非常注重與學生們的溝通，他強調：「定期安排和團隊內的每一位學生單獨見面並提供輔導是不可或缺的，只有這樣他們才能真正學到知識和技能。」王教授更適時鼓勵自己不同方向的研究團隊彼此溝通，並與校內外相關的研究團隊互相交流，使個人及團隊都能按照計劃進行學習及研究。王教授經常訪問與澳大有緊密合作的聯培院校，視察學生們的學習進度並及時改善問題。他亦積極參與各種與學生交流的活動，例如帶領研究生參觀國家重點實驗室、與學生茶聚及舉辦交流講座等。

角色轉換：學習包容多元化研究

王教授是一位理工科領域的傑出科研人員。自2022年6月起加入研究生院並擔任院長職務後，坦言因角色上的轉變，增加了接觸不同專業範疇研究生的論文及科研活動，從而擴闊自身對科研領域的認知，及改變對研究的看法。

王教授認為澳大作為一所國際化綜合性公立大學，必須尊重多元化及跨學科的研究，他說：「作為管理者，我認為更應該擁有包容多元化研究的心態，摒棄主觀的看法和指標去看待別人的研究。舉個例子，從理工科的觀點來看，會更注重創新技術突破，用數字的角度去做研究；但從文商科的觀點來看，卻更集中於心理學及人性化看待問題，用人文的角度去做研究。」王教授亦強調，每一個研究領域都有特定的慣例及難點，需多學習不同研究領域的標準，便能客觀地看待多元化及跨學科的研究。

王百鍵教授
Professor Pak Kin Wong

Innovative and Diversified Interdisciplinary Courses: Attracting Outstanding Talents from Various Regions

In recent years, UM has continued to improve academic disciplines it offers, adding graduate programmes in various fields and incorporating highly interdisciplinary project initiatives, such as master's degree programmes in data science and financial technology. By adding these programmes, UM aims to encourage postgraduate students to conduct interdisciplinary research, promote innovation, and facilitate knowledge exchange. UM is also constantly exploring new disciplines that have not been offered before, such as the upcoming graduate programmes related to art, public health, and smart ocean technology. This further develops diversified research in different disciplines, with a commitment to nurturing high-end talents for the four key pillar industries and promoting appropriate economic diversification in Macao.

With the rising demands of society, UM has aptly expanded the scale of its postgraduate programmes, aiming to continuously enhance the quality of its student intake. By launching a series of scholarship and grant schemes, such as the UM PhD Scholarship and the UM PhD Teaching Research Assistant scheme, UM aims to attract outstanding students from top universities, both locally and abroad, to enroll in its PhD programmes. Furthermore, the University of Macau Scholarship for Science, Technology, Engineering and Mathematics (STEM) Programmes has been established to attract local talents to pursue master's degrees in the field of science and technology, nurturing research professionals required for the emerging industries in Macao and neighbouring regions. Professor Wong states, "Establishing scholarships for local talents has helped in enrollment to a certain extent, but it still requires time to observe the effectiveness. We hope that after students' graduation, word-of-mouth recommendations will attract more local talents to choose UM as their place of study."

As the Dean of the Graduate School, Professor Wong also believes that the Graduate School of UM plays an important role in attracting postgraduate talents, managing postgraduate programmes and academic affairs, as well as assisting in the advancement of multidisciplinary development. The Graduate School has been committed to assisting academic units in the offering and revision of courses and plays a key role in nurturing talents through interdisciplinary collaboration and diversified disciplines.

PhD Joint Programmes: Expanding Research Collaboration and Enhancing Quality of Student Intake

In recent years, UM has actively engaged in academic and scientific research cooperation with institutions around the world, which includes PhD joint programmes with research institutes under the Chinese Academy of Sciences (CAS) and other renowned universities in mainland China. Students who participate in the programmes not only experience cross-regional education and diversified interdisciplinary approaches but also have opportunities to engage in postdoctoral research work at top higher education institutions after graduation. To date, UM has trained 77 students through such joint programmes.

Liang Yao was the first outstanding graduate under the mentorship of Professor Wong in the PhD joint programme of UM and the Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences. This joint programme provided him with a unique experience and precious opportunities. Liang Yao says, "Through the joint training at UM and CAS, I was able to enjoy the resources provided by both UM and the mainland. At UM, I am exposed to international development, while at CAS, I can pay more attention to the mainland, especially the Guangdong-Hong Kong-Macao Greater Bay Area, which broadened my horizons. At the same time, I had the opportunity to participate in national key projects, which significantly enhanced my comprehensive abilities."

Despite the high admission standards, this joint programme offers Liang Yao bright prospects after graduation. Liang Yao states that as the team from UM, CAS, and the Chinese University of Hong Kong have already established a collaborative relationship, he will go to the Chinese University of Hong Kong to pursue postdoctoral work and continue his research on healthcare robots.

Professor Wong believes that joint training programmes are significant for the scientific research development of UM. He states, "UM and CAS have their respective strengths in research experience and equipment resources. If both sides work together and leverage each other's advantages, it will accelerate the progress of collaborative research and expand the diversity of research fields. This will help attract more high-level postgraduate students, significantly improve the quality of student intake, and facilitate the development of subsequent cooperation between the two institutions."

In order to attract outstanding high-end talents continuously, Professor Wong acknowledges that UM is competing with various universities in the Greater Bay Area. He hopes that through joint training programmes and collaboration with various institutions, opportunities can be secured for UM researchers to have access to more resources across the academic, industrial, and medical fields. In the future, UM will actively develop joint training programmes with overseas and Portuguese-speaking countries to expand its international student body and thus contribute to the development of UM's internationalisation.

The Secret to Nurturing Talents: The Key Lies in Attention to Details and Effective Communication

Professor Wong has strict and meticulous requirements for academic standard. He carries forward the careful guidance methods from his mentor, personally reviewing and correcting every sentence and word in his students' theses. Liang Yao, a joint programme graduate mentored by him, shared his experience of how Professor Wong guided him as his mentor. Initially, he overlooked minor errors in his research thesis. Now, he pays meticulous attention to even every punctuation mark. This exemplifies the scholarly qualities that Professor Wong imparts to his students, emphasising precision which is a required quality for a researcher.

Professor Wong places great emphasis on communication with his students. He emphasises that "scheduling regular individual meetings and counselling with each student within the team are essential. Only in this way, students can truly learn and develop their skills." Professor Wong also encourages timely communication among his research team members from different directions and promotes interaction with relevant research teams both within and outside the university. This ensures that individuals and teams can make progress with their learning and research according to their plans. Professor Wong frequently visits the institutions closely collaborating with UM and inspects students' learning progress, making timely interventions to address any issues. In addition, he actively participates in various activities that involve interactions with students, such as guiding postgraduate students to visit State Key Laboratories, joining tea gatherings with students, and hosting exchange lectures.

澳大優秀學生獲頒獎學金
Outstanding students awarded scholarships at UM

Changing Roles: Embracing Diversified Research

Professor Wong is an outstanding researcher in the field of science and engineering. Since assuming the position of Dean of the Graduate School in June 2022, he acknowledges that this new role has exposed him to a wider range of academic theses and research activities in different disciplines. He frankly admitted that this has broadened his understanding of research and thus has changed his perspective on research as well.

Professor Wong believes that as an international public comprehensive university, UM must respect diversified and interdisciplinary research. He states, "As a university administrator, I believe it is important to have a mindset that embraces diversified research and to discard subjective views and indicators when assessing others' research. For example, from the perspective of science and engineering, there may be a greater focus on innovative technological breakthroughs and conducting research from a quantitative standpoint. However, from the perspective of humanities and social sciences, the emphasis may be on psychology and human-centred approaches when addressing issues." Professor Wong also emphasises that each research field has its own norms and challenges. It is necessary to learn the standards of different research fields to objectively appreciate diversified and interdisciplinary research.

港澳優青孫鵬展：享受做研究時的靈光一現

Pengzhan Sun, Awardee of the NSFC Excellent Young Scientists Fund (Hong Kong and Macao) : Embracing Inspiration in Research Endeavours

文：黃蕾君
Chinese & English Text: Lexie Huang

圖：馬文華、部分由受訪者提供
Photo: Martin Ma, partially provided by the interviewee

孫鵬展，澳大應用物理及材料工程研究院助理教授，他於 2023 年榮獲國家自然科學基金「優秀青年科學基金（港澳）」（簡稱「港澳優青」）資助，也是該年度澳門唯一獲此殊榮的學者。孫鵬展教授 2016 年博士畢業於清華大學，並於 2016-2022 年期間在英國曼徹斯特大學物理與天文系和國家石墨烯研究院從事博士後研究工作，合作導師為 2010 年諾貝爾物理學獎獲得者 Andre Geim 教授。他主要從事強限域空間物質輸運過程及機理的基礎研究，以第一及通訊作者在 *Nature* 等學術期刊發表論文 20 餘篇，授權發明專利 3 項。

Pengzhan Sun serves as an assistant professor at the Institute of Applied Physics and Materials Engineering of UM. In 2023, he was awarded the Excellent Young Scientists Fund (Hong Kong and Macao), being the only recipient in Macao for that year. Professor Sun obtained his PhD degree from Tsinghua University in 2016. Then he worked as a postdoctoral researcher at the Department of Physics and Astronomy and the National Graphene Research Institute of the University of Manchester in the UK from 2016 to 2022. During this period, he collaborated with Professor Andre Geim, the Nobel laureate in physics in 2010. Professor Sun's research focuses on the fundamental understanding of mass transport under strong confinement. He has published more than 20 papers in top academic journals such as *Nature* as the first and corresponding author. Additionally, he was granted three invention patents.

學生時期的研究成果受諾貝爾獎得主高度好評

2004 年，英國曼徹斯特大學的 Andre Geim 和 Konstantin Novoselov 教授在實驗室成功製備了二維材料——石墨烯。石墨烯是一種單原子層的碳納米結構，這一完美的二維系統在電學、力學和光學方面有着獨特迷人的特性，引起世界各地學者的研究熱潮。Andre Geim 和 Konstantin Novoselov 教授亦因其對石墨烯的開創性研究被授予 2010 年諾貝爾物理學獎。隨着納米器件製備技術的逐漸成熟，二維尺度上物質的傳輸行為引發了學界更多的關注。

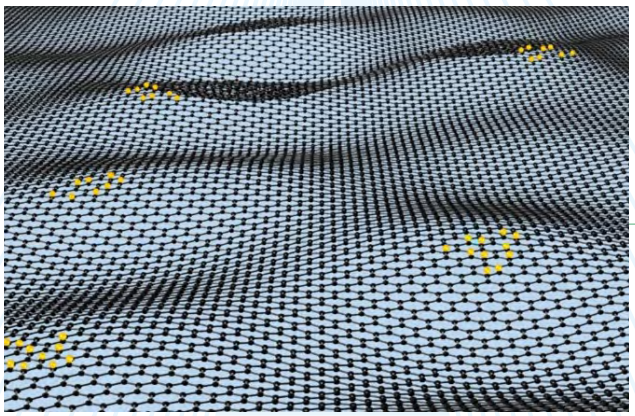
孫鵬展教授本科和博士就讀於中國頂尖學府清華大學，主要從事碳納米材料的製備及性能研究。博士期間，他已取得了很多令人羨慕的成績——以第一作者身份在國際知名期刊上發表多篇 SCI 收錄論文，研究成果多次被諾貝爾獎得主 Andre Geim 團隊引用，並獲得他的高度好評，為日後加入其團隊奠定了基礎。孫教授曾經獲得美國材料研究學會研究生銀獎，清華大學特等獎學金等。2016 年博士畢業後，他加入了 Andre Geim 的實驗室從事博士後工作，並以第一及通訊作者在 *Nature* 和 *Nature Communications* 等頂級學術期刊發表論文。

博士在讀期間的孫鵬展和 Andre Geim 教授
Pengzhan Sun and Professor Andre Geim during his PhD studies

榮獲 2023 年度「港澳優青」

2022年，孫教授加入澳大應用物理及材料工程研究院，開始着手對強限域空間物質輸運過程及機理的基礎研究進行深入探索。他的研究項目「原子尺度限域空間的分子輸運過程研究及應用」於2023年榮獲國家自然科學基金「優秀青年科學基金（港澳）」資助，他也是該年度澳門唯一獲此殊榮的學者。該項目通過精細操縱微觀構築單元，構造一個原子尺度的通道或孔洞，研究與之大小相近或比通道更小的分子、離子穿過通道的過程。

「為什麼要構造這麼小的通道呢？」常見的氣體分子、水溶液中的離子的特徵尺寸均為原子尺度，如果能使原子尺度孔道的構築過程成為可能並進一步可控，就可以充分發揮通道與這些分子、離子的相互作用，獲得盡可能大的選擇性，從而實現不同分子、離子的有效分離。孫教授表示：「這個製備過程好比樂高遊戲，利用樂高積木搭建一個特定結構，也就是我們所說的原子尺度大小的孔道，所用的樂高積木就是不同種類的二維晶體。我們要用它實現的過程好比用吃火鍋或煮麵條用的漏勺來截留比孔道大的東西，從而讓更小的東西（比如湯底）漏過去。但更加精妙之處在於，漏勺只能截留住看得見的食物，但對於湯中的具體成分的分離無能為力，而我們所構造的孔道可以在原子尺度將不同物質進行有效分離。」



此圖示意了石墨烯薄膜表面的納米尺度波紋具有意想不到的高催化活性，可裂解氫分子，所得質子或氫原子可進一步穿過石墨烯晶格
This figure illustrates that nanorippled graphene membrane exhibits unexpectedly high catalytic activity with respect to the splitting of hydrogen, with the resulting protons/hydrogen adatoms able to then flip across the graphene lattice

這種篩分過程有望在化工、環境、生物領域發揮重要作用。化工上，可以將原油中的不同有機分子進行有效精準篩分，從而獲得附加值更高的單一組分。環境上，可用於海水淡化，將鹽分從海水中分離出去，獲得淡水，目前常用的蒸餾法需要加熱，需要耗費大量能源，如果利用原子尺度通道構成的薄膜進行過濾分離，可大幅降低能耗。生物上，細胞膜上遍佈離子通道蛋白，而生物體的信息傳遞與交互以及很多重要生命過程大多以帶電離子或其他生物分子選擇性通過特定的通道蛋白來實現，但背後機制較為複雜，而這一研究工作有望從物理層面通過構造更為簡單的通道模型來探究並模擬通道蛋白的選擇篩分過程。

被澳大的科研和文化環境吸引

談及為何選擇澳大作為新的起點，孫教授說：「澳大為年輕學者提供了一個相對寬鬆的科研環境，在這裡可以選擇自己感興趣的研究方向，並有機會得到大學、澳門特區政府以及內地的科研資源和資金支持，也可以相對自由地根據自己的步調和節奏推進我感興趣的科研項目。除了科研環境之外，澳大以及整個澳門也提供了一個中西合璧的獨特文化環境，人文氣息比較濃厚，這令我很享受。」

除了日常的科研和教學工作外，孫教授也是一位藝術愛好者，他在英國多年收藏了很多西方油畫、雕塑及瓷器等藝術品，在回國前他將這些收藏品全都運到了澳門。他同時也特別喜歡中國傳統藝術，來到澳門，這裡獨特的中西融會貫通的藝術形式令他十分欣喜，比如在澳大圖書館展覽的一些看似西方的油畫往往就含有中國元素，傳統的中國水墨畫又融入了西方水彩畫的特色。孫教授認為，人文環境也會反過來促進科學研究。「藝術對於視野以及思維的開拓很有幫助，我在做研究時，也會非常注重數據和成果的美感。」孫教授說。

孫鵬展教授在澳門家中的部分油畫和藝術擺件
Oil paintings and collectables in Professor Pengzhan Sun's home in Macao

樹立正確的科研價值觀

國學大師陳寅恪有個著名的「三不講故事」，書本裡有的他不講，別人講過的他不講，他自己講過的也不講。孫鵬展教授的科研價值觀與此類似——已經發展得特別完善的方向，文獻報導很多的方向，我們不做；別人做過或正在做的方向，我們不做；以前做過的，只剩下縫縫補補的工作，我們儘量不做。但與此同時，他極重視以過去得到的科研成果和經驗為基礎，深挖自己或者其他人忽略或未知的東西。

他亦認為，團隊合作很重要。「我很喜歡和高手切磋，有句話講，和高手過招，自己的水平會越來越高。過去幾年和高手過招讓我成長很多，也建立了長久的友誼，現在我們仍在一些最前沿和有意思的課題上進行合作，將來會一直合作下去，我相信這種合作會源源不斷產生更多好的科研成果。」孫教授說。

談及科研路上的挫折，孫教授分享了一個小故事，幾年前疫情來勢洶洶，隔離在家無法做實驗令他十分苦惱。當時正值他做完一個實驗得到一組數據，在家苦苦思索多日卻始終無法做出合理解釋。有一天早上六點，他突然醒來，腦子裡靈光一現，在半夢半醒間竟然得到了答案。他認為，那一瞬間產生的巨大的精神愉悅是他做研究時最享受的時刻。

Research Results during His PhD Studies Earned High Praise from Nobel Laureate

In 2004, Professor Andre Geim and Professor Konstantin Novoselov from the University of Manchester in the UK made a groundbreaking discovery in their laboratory: graphene, a remarkable two-dimensional material. Graphene consists of a single atomic layer of carbon, forming a perfect two-dimensional structure that exhibits extraordinary electrical, mechanical, and optical properties, which has captured attention of researchers worldwide. This pioneering research on graphene made Professor Andre Geim and Professor Konstantin Novoselov the winner of the Nobel Prize in Physics in 2010. As nanodevice fabrication techniques have advanced, there has been a growing interest in studying the intricate behaviour of mass transport at the two-dimensional scale.

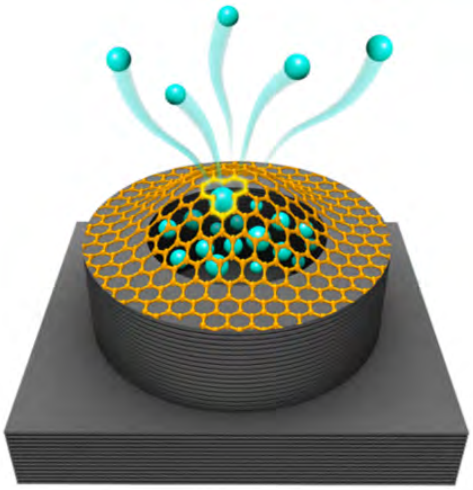
Professor Sun received his undergraduate and PhD degrees from Tsinghua University, one of China's top universities, where he dedicated himself to the research of the production and properties of carbon nanomaterials. Even during his PhD studies, he achieved remarkable achievements. As the first author, he published several papers in internationally renowned journals indexed by SCI, and his research findings garnered citations from the team led by Nobel laureate Professor Andre Geim. Professor Geim himself highly praised Professor Sun's work, which laid a solid foundation for his future collaboration with the Professor Geim's team. Furthermore, Professor Sun received the silver award of Materials Research Society Graduate Student Awards, and a Tsinghua University distinguished scholarship. Following his PhD studies in 2016, he joined Professor Geim's laboratory for postdoctoral work, and published papers in top academic journals such as *Nature and Nature Communications* as first and corresponding author.

Awarded a Grant from the NSFC Excellent Young Scientists Fund (Hong Kong and Macao) in 2023

In 2022, Professor Sun joined the Institute of Applied Physics and Materials Engineering (IAPME) of UM to pursue research on the fundamental understanding of mass transport under strong confinement. His research project, titled "Research and Application of Molecular Transport under Angstrom-scale Confinement" was awarded a grant from the Excellent Young Scientists Fund (Hong Kong and Macao) in 2023. Notably, he was the only scholar in Macao to receive the grant that year. The project aims to construct a pore under atomic scale through the precise control of microscopic constituent units. It focuses on the study of the process of molecules and ions of similar/smaller size passing through the pore.

"Why construct such small pores?" The answer lies in the fact that the common gas molecules and ions in aqueous solutions have characteristic sizes on the atomic scale. If it is able to construct atomic-scale transport channels and further control the construction process, the interaction between the transport and molecules/ions can be fully harnessed. This allows us to achieve maximum selectivity and effectively separate different types of molecules and ions. Professor Sun describes, "This construction process is like playing with Lego blocks, where the Lego bricks are two-dimensional crystals of different types used to build a specific structure - the atomic-scale pore we mentioned. This process is akin to using a strainer while enjoying hot pot or cooking noodles, where the strainer catches larger

items while allowing smaller ones, like the soup base, to pass through. However, the clever aspect lies in the fact that the colander can only capture visible food and lacks the power to separate specific components within the soup. In contrast, the transport channels we construct have the ability to effectively separate different substances at the atomic scale."



此圖揭示了石墨烯薄膜中的原子級別孔道具有指數級別巨大的分子篩分選擇性
This figure reveals that angstrom-scale pores in graphene membranes exhibit exponentially large selectivity for molecular sieving

This separating process holds great potential in the fields of chemical engineering, environmental science, and biological science. In chemical engineering, it can effectively and precisely separate different organic molecules in crude oil, thereby obtaining individual components with higher added value. In the environmental field, it can be used for the desalination of seawater, separating salt from seawater to obtain fresh water. Unlike the commonly used distillation method that requires heating and consumes a large amount of energy, membranes composed of atomic-scale transport channels for filtration and separation can significantly reduce energy consumption. In biology, ion channel proteins are present on cell membranes. These proteins play crucial roles in information transmission, interaction, and various vital biological processes within organisms. They selectively allow the passage of charged ions or other biomolecules through specific channel proteins. However, the underlying mechanisms are highly complex. This research enables exploration and simulation of the selection and separation processes of channel proteins from a physical standpoint by constructing simpler channel models.

Attracted by UM's Research and Cultural Environment

When discussing his decision to make UM his new academic home, Professor Sun states, "UM offers a relatively relaxed research environment for young scholars, allowing me to pursue research in areas of my interest. In addition, UM, the Macao SAR government and mainland China, provide access to multiple research resources and grants. Moreover, the freedom to advance research projects at my own pace is also a valuable aspect. Apart from the research environment, UM and Macao present a unique blend of Eastern and Western cultures, creating an atmosphere with a strong humanistic touch, which I thoroughly enjoy."

In addition to his daily research and teaching work, Professor Sun is also an art enthusiast. During his time in the UK, he collected a diverse range of Western oil paintings, sculptures, and ceramics. Before returning to China, he transported his entire art collection to Macao. Furthermore, he has a deep appreciation for traditional Chinese art. Upon arriving in Macao, he was delighted by the unique fusion of Chinese and Western art forms. For instance, he found great joy in discovering that some Western oil paintings showcased in the UM Library actually incorporate Chinese cultures. Additionally, he found it fascinating how some traditional Chinese ink paintings integrated with the characteristics of Western watercolour paintings. Professor Sun believes that the humanities environment can also in turn promote scientific research. "Art is helpful in expanding one's perspective and thinking. When conducting research, I also pay attention to the beauty of data and results," reflects Professor Sun.

Establishing Correct Research Values

Yinke Chen, a master of Chinese culture, had a famous saying that he would not discuss three things, namely things already mentioned in books, things that others have already discussed, and things that he has previously discussed. Professor Sun's research values bear similarities to this approach — he would not pursue 1) directions that have already been extensively explored and thoroughly documented in existing literature; 2) directions that others have undertaken or are currently engaged in; 3) directions that have been previously undertaken leaving merely some minor unfinished tasks for completion. Yet at the same time, he greatly values building upon past research outputs and experiences. He digs to uncover overlooked or unknown aspects, whether they have been overlooked by himself or others in the field.

He also recognises the importance of teamwork, stating "I truly enjoy engaging in friendly competition with experts. As the saying goes, 'when you spar with the best, your skills will continually improve'. Over the past few years, challenging myself against these experts has led to significant personal growth and the establishment of enduring friendships. Currently, we are still collaborating on cutting-edge and interesting research projects, and we will continue this cooperation in the future. I believe that this ongoing cooperation will consistently produce remarkable research results."

When discussing the challenges encountered on his research journey, Professor Sun shared a personal story. A few years ago, during the pandemic, he was isolated at home and unable to conduct experiments. This situation brought him great distress. At that time, he had just completed an experiment and obtained a set of data. Despite days of contemplation at home, he struggled to find a reasonable explanation for the results. Then, one morning at 6 am, he suddenly woke up with a rush of inspiration. In that semi-conscious state, he astonishingly found the answer he had been seeking. He believes that the moment of intellectual satisfaction is the most rewarding and enjoyable aspect of his research endeavours.

孫鵬展教授與研究團隊討論
Professor Pengzhan Sun is having discussion with his research team

澳大濠江學者利安琪：從游泳池到實驗室，「澳門蛙后」的完美蛻變

UM Macao Fellow On Kei Lei: From Swimming Pool to Laboratory, the Perfect Transformation of the “Frog Queen” of Macao

文：黃蕾君、馬文華
Chinese & English Text: Lexie Huang, Martin Ma

圖：由受訪者提供
Photo: Provided by the interviewee

2022 年，澳大教育學院博士畢業的利安琪通過「澳大濠江學者」計劃加入澳大，獲聘為教育學院博士後研究員。在開啟學術生涯之前，利博士曾是一名專業的游泳運動員，被譽為「澳門蛙后」。她先後代表澳門出戰多項國際賽事，並取得了令人矚目的成績。從游泳池到實驗室，利博士在澳大完成了運動員到研究員的完美蛻變。她專注於運動及飲食干預對不同群體的心肺代謝功能、認知功能及腸道菌群等研究領域。對於能夠成為濠江學者，利博士深感榮幸，她認為，這不僅肯定了她近年取得的科研成果，也為她提供了更好的研究機會。

In 2022, Dr. On Kei Lei, who obtained her PhD degree from the Faculty of Education (FED) of UM, was honoured as an awardee of the UM Macao Fellow scheme. She was appointed as a postdoctoral researcher of FED. Before embarking on her academic career, Dr. Lei was a professional swimmer and was known as the “Frog Queen” of Macao. She has represented Macao in various international competitions with impressive results. From the swimming pool to the laboratory, Dr. Lei has made a perfect transformation from an athlete to a researcher at UM. Her research focuses on the effects of exercise and dietary interventions on cardiorespiratory function, cognitive function, and gut microbiota in different populations. Dr. Lei feels deeply honoured to be a UM Macao Fellow, which she believes not only recognises her recent scientific outputs but also provides her with better research opportunities.

從「游泳池」到「實驗室」

在踏足學術界之前，利安琪有着近二十年輝煌的游泳運動員生涯，並取得驕人成績，被譽為「澳門蛙后」。她 8 歲開始學習游泳，13 歲就代表澳門出戰多項海內外賽事，曾創造出亞運會首次晉級女子個人項目決賽及首次女子個人項目奪得獎牌的輝煌歷史。

2015 年，利安琪在日本接受游泳訓練期間注意到當地不僅研究高強度間斷性運動改善心臟和肺功能的成效，還把這種方法應用在運動員的常規訓練中。回到澳門之後，她懷着將所學訓練技巧應用和普及的願景，入讀澳大體育教學及運動碩士課程，並遇上教育學院副院長孔兆偉教授這位伯樂。正是因為這個選擇，她不僅開拓了個人的學術旅程，同時也逐步轉型，從一位擁有專業競技背景的「運動員」蛻變為一名「研究員」。

談及這個轉變，利安琪說道：「在大家眼中看起來是一個行業的轉變，其實對我自己來說，做研究一直挺符合我的性格，因為我是一個很喜歡提問題、找答案的人。比如說以前游泳時教練帶我們去高原訓練，我就會想為什麼高原訓練效果會更好。我很喜歡聽教練解釋為什麼要這樣訓練，原來在高原低氧的環境刺激下，會增加身體中血紅蛋白的帶氧能力，刺激人體心肺功能，提升效率。我覺得這些東西很有趣。」

2022 年博士畢業利安琪與孔兆偉教授合照
Professor Zhaowei Kong and On Kei Lei at her PhD Graduation in 2022

「濠江學者」是對研究工作的肯定

利安琪於2018年和2022年先後完成澳大體育教學及運動碩士及博士學位課程，在此期間，她的研究聚焦於分析低碳高脂飲食法和高強度間歇運動對於人體生理和心理健康的影響。低碳高脂飲食法能減少血糖與胰島素的波動，令血糖維持在適宜的水平，從而使我們感到精神飽滿。高強度間歇訓練是在短時間內進行全力運動並在中間穿插低強度活動或完全休息，如此反覆以達到最大強度運動。利博士的研究取得了優秀成果，並在知名期刊發表了多篇高質量論文，她亦希望所做的研究能夠為運動員提供更多指導，改善運動員的賽場表現。利安琪感謝導師孔兆偉教授對她的支持和指導，她說：「孔教授從我的研究生階段起一直啟發着我，給予我非常多的鼓勵。」

博士畢業後，利安琪順利通過「澳大濠江學者」計劃成為教育學院的博士後研究員。她表示：「作為一名研究人員，我們希望所做的研究能有新的發現，填補空白。對於年輕學者來說，外界的肯定也很重要。成為濠江學者對我來說是一種莫大的鼓勵和支持，肯定了我所做研究的意義。」

保持可持續性的身心狀態做研究

「澳大濠江學者」計劃鼓勵學者「走出去」，並為學者提供到世界頂尖學府深造的機會。2023 年 2 月，利博士來到美國一流的研究型大學加州大學洛杉磯分校（UCLA）從事博士後研究工作，進行臨床營養試驗的研究。她主要負責的研究項目為「核桃對於長新冠患者認知功能及症狀的影響」，這項研究將分析受試者在食用核桃 12 周之後，其認知功能及長新冠症狀的改善情況。她亦參與了「牛油果如何作用於腸道微生物群」以及「索馬魯肽對肥胖受試者棕色脂肪組織活性的影響」這兩個研究項目。

此外，她還參與了兩項由美國國家衛生院在全美範圍之內進行的研究項目，其中一項是透過研究飲食、基因、蛋白質、微生物群、新陳代謝和其他個體因素之間的相互作用來觀察個體對不同飲食的差異。另一項則將利用人工智能以開發預測個人對食物和飲食模式反應的算法。

利博士坦言，比起匆忙和焦慮的博士時期，目前的她更願意放慢腳步，尋求一種可持續性的生活狀態，保持身心都健康，這樣反而能更好地做研究。她說：「自從讀了博士之後，我的生活習慣就一直在改變。我在澳大讀博的時候會非常忙碌，即使在週末我也會給自己安排工作，但是到了博士後階段，我會維持一種可持續性的生活狀態。來到 UCLA 之後，週末我就會和朋友一起去爬山，去打沙灘排球放鬆一下，這樣下週一開始的時候我感覺自己充滿了能量。」

利安琪博士（右）和 UCLA 人類營養中心研究團隊
Dr. On Kei Lei (right) with the research team at the UCLA Center for Human Nutrition

From Swimming Pool to Laboratory

Before her academic journey, On Kei Lei had a brilliant career as a swimmer for nearly two decades and achieved impressive results, earning her the title of “Frog Queen” of Macao. She started swimming at the age of 8 and represented Macao in various local and international competitions at the age of 13. Incredibly, she created a glorious history by qualifying for the first ever advancement to the finals and winning the first ever Women’s Individual medal at the Asian Games.

In 2015, during her swimming training in Japan, Lei observed that the benefits of high-intensity interval training in enhancing cardiac and pulmonary function were not only being studied but also implemented in the regular training routines of athletes in Japan. Upon returning to Macao, she pursued a master’s degree in Physical Education and Sport Studies at UM with the vision of applying and popularising the training techniques she had learned. It was during this time that she met Professor Zhaowei Kong, the Associate Dean of the Faculty of Education, who became her mentor. This choice not only propelled Lei on her academic journey but also gradually transformed her from a professional athlete with a successful competitive background to a researcher.

When discussing this transformation, Lei says, “While it may appear as a change of profession to others, for me, conducting research has always been a good fit for my personality because I am a person who enjoys asking questions and seeking answers. For instance, during my swimming days, when my coach had us engaged in training sessions at high-altitude locations, I would question why high-altitude training would be more effective. I like to listen to my coach explaining the reasons behind these training methods. It turns out that training in a low-oxygen environment at high altitudes stimulates the increase of oxygen-carrying capacity of body’s hemoglobin, which in turn enhances cardiopulmonary function and improves efficiency. I find these aspects very fascinating.”

UM Macao Fellow: a Praise for Research Work

Lei completed her Master’s and PhD degree in Physical Education and Sports Studies at UM in 2018 and 2022, respectively. During this period, her research focused on analysing the effects of a low-carbohydrate high-fat diet and high-intensity interval training on physiological and psychological health. A low-carbohydrate high-fat diet

helps reduce fluctuations in blood glucose and insulin levels, keeping them at an appropriate level, which in turn makes us feel refreshed. High-intensity interval training involves performing high-intensity exercises for a short period of time, interspersed with low-intensity activities or complete rest, to achieve maximum intensity workouts. Dr. Lei's research has achieved excellent results, and she has published several high-quality papers in well-known journals. She also hopes that her research can provide more guidance to athletes and improve their performance on the sports field. Dr. Lei expresses her gratitude to her supervisor, Professor Kong, for his support and guidance, saying, "Professor Kong has been inspiring me since my postgraduate studies and has given me a lot of encouragement."

After completing her PhD studies, Dr. Lei successfully became a postdoctoral researcher in FED through the UM Macao Fellow scheme. She states, "As a researcher, I always hope to make new discoveries and fill in knowledge gaps in our research. For young scholars, external recognition is also important. Being a UM Macao Fellow is a great encouragement and support for me. It affirms the significance of my research."

Maintaining a Sustainable State of Mind and Body while Conducting Research

The UM Macao Fellow scheme encourages scholars to "go abroad" and provides opportunities for scholars to further their studies at top universities around the world. In February 2023, Dr. Lei went to the United States to engage in postdoctoral research at a prestigious research university, the University of California, Los Angeles (UCLA). She is involved in conducting clinical nutrition trials, focusing on the research project titled"The Effect of Walnut on Memory in Subjects with Long Covid Symptoms". This study aims to analyse the improvement in cognitive function and symptoms of subjects after 12 weeks of walnut consumption. She is also involved in two other research projects on the effects of daily avocado consumption on gut microbiota and the effects of somatostatin on brown adipose tissue activity in obese subjects.

In addition, she participated in two research projects conducted nationwide by the National Institutes of Health (NIH) in the United States. One project aims to examine individual differences observed in response to different diets by studying the interactions between diet, genes, proteins, microbiome, metabolism and other individual contextual factors. The other project involves utilizing artificial intelligence to develop algorithms to predict individual responses to foods and dietary patterns.

Dr. Lei explains that compared to the hectic and anxious days during her PhD studies, now she prefers to slow down and seek a sustainable lifestyle that keeps both her mind and body healthy, ultimately enhancing her research capabilities. She shares, "My lifestyle has been changing since my time as a PhD student. When I was studying at UM, I was always busy, and allocating time for work even on weekends. However, during my postdoctoral stage, I strive to maintain a sustainable lifestyle. Since coming to UCLA, I spend my weekends hiking and playing beach volleyball with friends to relax. This way leaves me feeling energised and ready to tackle the new week when Monday comes."

利安琪博士參加 2023 年 UCLA David Geffen 醫學院研究日
Dr. On Kei Lei participated in the 2023 UCLA David Geffen School of Medicine Research Day

澳大濠江學者黃滿安：做個「擁抱不確定性」的科研人

UM Macao Fellow Mun On Wong: A Researcher Embracing Uncertainty

文：黃蕾君、馬文華
Chinese & English Text: Lexie Huang, Martin Ma

圖：趙怡瑋、部分由受訪者提供
Photo: Eva Zhao, partially provided by the interviewee

2022 年，博士畢業於香港大學的黃滿安通過「澳大濠江學者」計劃加入澳大，獲聘為科技學院土木及環境工程系研究助理教授。他聚焦於建築業及施工環境的數字化和智能化研究，並注重理論與實際的緊密結合，期望能夠為澳門建築業的發展做出貢獻。他不僅將其跨學科的經驗視為一種以多元視角看待世界的思考方式，更強調好奇心與自我驅動力在科研工作中的重要性。黃教授很榮幸成為「澳大濠江學者」，並表示該計劃為他提供一個全方位發展平台。

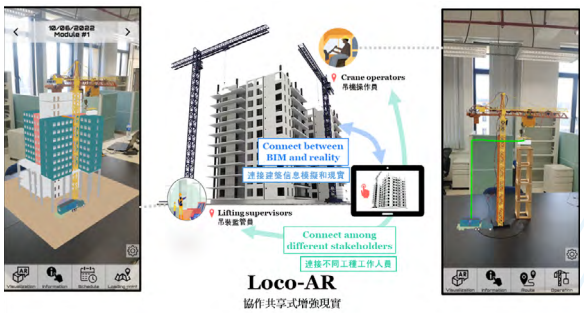
In 2022, Mun on Wong, graduated with a PhD degree from the University of Hong Kong, joined UM through the UM Macao Fellow scheme. He was appointed as a research assistant professor in the Department of Civil and Environmental Engineering of the Faculty of Science and Technology. His research primarily focuses on digitalisation and intelligence of the construction industry and construction environment. He places great importance on the integration of theory with practical applications, aiming to contribute to the development of Macao's construction industry. He sees his interdisciplinary experience not only as a way of viewing the world from various perspectives, but also emphasises the significance of curiosity and self-motivation in scientific research. Being selected as a UM Macao Fellow is a great honour for Professor Wong, and he expresses gratitude for the scheme, as it provides a systematic platform for his growth.

助力打造數字化、智能化的澳門建築

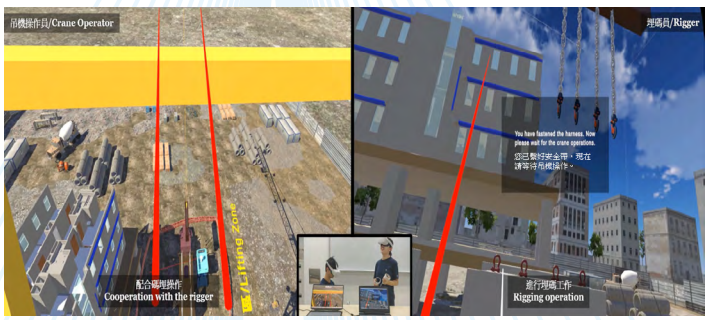
在傳統行業加速智能化轉型的今天，過去靠「搬磚頭、紮鋼筋、澆混凝土、裝模板」的建築行業也在逐步實現智能化及數字化。黃滿安教授正是深耕這一領域的踐行者。他的主要研究方向為建築信息學和建築信息建模、模塊化施工和智能施工管理、使用協作增擴實境 (AR) / 虛擬實景 (VR) 進行虛擬原型製作和信息可視化、多傳感器數據融合的室內導航。自2022年加入澳大以來，他主要致力於兩項研究課題：「增擴實境輔助的人機交互應用於天秤遙距操作」，以及「集成建築信息模擬與多人虛擬實境的協作式建造安全培訓」。

黃教授表示：「增擴實境（AR）輔助的人機交互應用於天秤遙距操作，可以使得不同工種的人員在操作天秤過程中在信息交流和協同方面變得更加暢通，以達到天秤的遠程遙控。而集成建築信息模擬與多人虛擬實境的協作式建造安全培訓，旨在打造一個多元協同的虛擬現實（VR）塔吊操作，通過創造逼真的施工環境，讓不同工種的人員在虛擬環境中進行協同的安全訓練，以提高團隊的整體協作能力。」

黃教授強調他的研究並不只停留在理論層面，目前也正在與企業合作，探索如何將這些研究成果應用到實際工作中。黃教授說：「我們在試驗這兩種系統的有效性，與傳統的培訓方式進行比較，並期待在未來有機會將這些研究成果真正應用到現實生活中。」



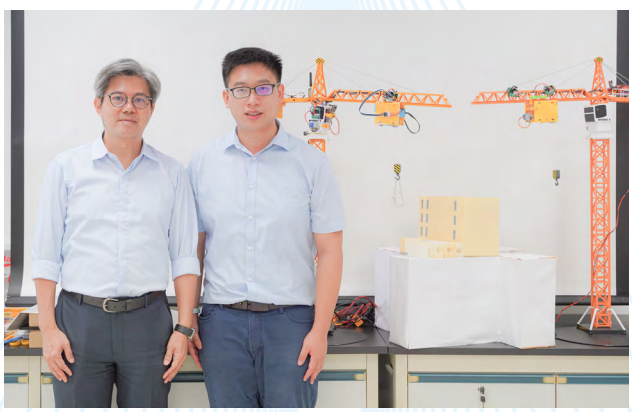
增擴實境輔助的人機交互應用於天秤遙距操作
AR-assisted human-machine interactions for tower crane teleoperation



集成建築信息模擬與多人虛擬實境的協作式建造安全培訓
BIM and multi-user VR for collaborative construction safety training

「澳大濠江學者」：行之有效的人才培養計劃

「澳大濠江學者」計劃旨在招聘及培養本地年輕學者，同時吸引澳門傑出人才留澳發展，成功的申請者不僅可以在澳大持續開展研究，還有機會到世界名校和機構擔任訪問學者或研究員，進一步提升科研經驗，開拓國際視野及豐富專業知識。



黃滿安教授（右）和導師林智超教授（左）
Professor Mun On Wong and his mentor Professor Chi Chiu Lam

黃教授在 2022 年成為「澳大濠江學者」，並於 2023 年遠赴英國劍橋大學進行科研交流，他認為該計劃最大的吸引力在於其系統化的人才培養路徑。在他看來，該計劃包括三大亮點：一是為每一位濠江學者配對一名資深導師，以幫助年輕的科研人員快速成長；二是青年學者能夠參與各類科研基金的申請和管理工作，逐步從項目的參與者轉變為獨立的項目負責人，成為更立體更全面的科研人；三是提供世界頂尖名校的交流機會，以增強自身的科研視野，提升學術水平。「『澳大濠江學者』計劃的導師制度讓我受益匪淺，我和導師林智超教授建立了亦師亦友的關係，他不僅給我很大的自由去探索自己最想探索的領域，還會分享他過往的經歷以及科研道路上的見解，這對我學術生涯的規劃起到了很大的幫助。」黃教授說。

談及在劍橋大學學習交流的經歷，黃教授期望能在劍橋大學開展最先進的研究，並與頂級教授合作，吸收最新的知識。他亦期待透過這些科研經驗和知識，引領澳門建築業的發展，從而更好地服務澳門社會。

做個「擁抱不確定性」的科研人

黃教授亦是一位跨學科研究的探索者，早在本科階段，他就在上海交通大學主攻土木工程，並輔修國際經濟與貿易專業。他認為，透過探索不同的學科，能夠拓寬我們的思維模式，從不同的學科角度審視同一件事情，以此理解這個世界。他目前正在進行的多元協同VR塔吊操作項目就是一個生動的例證。「該項目融合了多種專業知識，不僅需要知道土木領域的知識，例如塔吊的承載能力，還需要運用計算機科學的知識來建立建築信息模型。」他說。

對有志於從事科研工作的年輕人，黃教授注重強調要「保持好奇心」和「擁抱不確定性」。他表示：「好奇心是至關重要的，當你投入自己熱愛或自認為極具意義的課題時，你將擁有自我驅動的力量。即使未來遇到挑戰，你依然會堅持下去，因為這是你自己選擇的道路，且你有着將想像轉化為現實的強烈期望。」他亦認為，做科研需要擁抱不確定性，因為做科研可能十次當中有九次失敗，一次沒有那麼失敗。此外，科研人員還需要管理好自己的現狀和期待，在不確定當中找到自我平衡。

黃滿安教授正在使用儀器進行三位掃描重建實驗
Professor Mun On Wong is conducting a 3D scanning and reconstruction experiment using instruments

Boosting the Digitalisation and Intelligence of Construction Industry in Macao

Today, as traditional industries accelerate their intelligent transformation, the construction industry, which used to rely on “moving bricks, fixing steel bars, pouring concrete and installing formwork”, is also gradually becoming intelligent and digitalised. Professor Wong is a dedicated practitioner in this field, actively contributing to its advancement. His research primarily revolves around construction informatics and building information modelling, modular construction and smart construction management, virtual prototyping and information visualisation using collaborative AR/VR, as well as indoor navigation with multi-sensor data fusion. Since joining UM in 2022, Professor Wong has been focusing on two key research topics: “AR-assisted human-machine interactions for tower crane teleoperation” and “BIM and multi-user VR for collaborative construction safety training”.

Professor Wong says, “‘AR-assisted human-machine interactions for tower crane teleoperation’ enables smoother communication and collaboration among personnel of different trades during the tower crane operation process, achieving the goal of remote control of tower cranes. Meanwhile, ‘BIM and multi-user VR for collaborative construction safety training’ aims to create a diversified collaborative VR scenario for crane operations by creating a realistic construction environment, allows personnel from various trades to engage in collaborative safety training within a virtual setting, enhancing the overall teamwork collaboration.”

Professor Wong emphasises that his research does not just stay at the theoretical level. He is currently collaborating with companies to explore how these research findings can be applied to practical work. Professor Wong states, “We are testing the effectiveness of these two systems, comparing them with traditional training methods, and looking forward to the opportunity to apply these research results to real life in the future.”

UM Macao Fellow: An Effective Talent Cultivation Scheme

The UM Macao Fellow scheme aims to nurture young scholars of Macao and encourage qualified local talents to pursue career development in Macao. Besides engaging in research at UM, successful applicants will have the opportunity to work as visiting scholars or researchers at world-renowned universities or institutions to enhance their research experience, broaden their international horizons, and enrich their professional knowledge.

Professor Wong became a UM Macao Fellow in 2022 and conducted research at the University of Cambridge in the UK in 2023. He believes that the greatest attraction of this scheme is its systematic approach to talent cultivation. In his view, the scheme encompasses three key highlights. Firstly, each Macao Fellow is paired with a senior mentor who plays a crucial role in fostering the rapid growth of young researchers. Secondly, the scheme offers opportunities for young scholars to actively engage in the application and management of various research project grants. This involvement allows them to transit from being mere participants to becoming project principal investigators, thus becoming more all-rounded and comprehensive researchers. Lastly, the scheme provides exchange opportunities with top world-renowned universities, enhancing the research vision of Macao Fellows and elevating their academic level. "The mentorship system of the 'UM Macao Fellow' scheme has benefited me immensely. I have established a mentor-mentee relationship with Professor Chi Chiu Lam, who is both a teacher and a friend. He not only gives me a great deal of freedom to explore the areas I'm most interested in but also shares his past experiences and insights on the scientific research path, which has been greatly helpful for planning my academic career," says Professor Wong.

Talking about his learning and exchange experience at University of Cambridge, Professor Wong enjoyed the opportunity to carry out cutting-edge research at University of Cambridge and collaborate with top professors to absorb the latest knowledge. He also looks forward to using these research experiences and knowledge to lead the development of the construction industry in Macao, thereby better serving the Macao community.

Being a Researcher Embracing Uncertainty

Professor Wong is also an explorer of interdisciplinary research. As early as his undergraduate years, he majored in Civil Engineering and minored in International Economics and Trade at Shanghai Jiao Tong University. He believes that exploring different disciplines can broaden mindset and should understand the world by looking at the same thing from different disciplinary perspectives. The multifaceted collaborative VR tower crane operation project that he is currently working on is a vivid example of this approach. "This project integrates various professional knowledge, requiring not only civil engineering insights, such as the load-bearing capacity of the tower cranes, but also the application of computer science knowledge to establish building information models," he explains.

For young people aspiring to pursue a career in scientific research, Professor Wong emphasises the importance of "maintaining curiosity" and "embracing uncertainty." He says, "Curiosity is crucial, and when you engage yourself in a subject you love or believe to be of great significance, you will have the self-motivation to drive forward. Even if there are challenges ahead, you will continue to persevere because this is the path you have chosen for yourself and you have a strong desire to turn imagination into reality." He also believes that researchers need to embrace uncertainty because they might fail nine times out of ten, and not so much once. Moreover, researchers need to manage their present situation and expectations well in order to find a personal balance amidst uncertainty.

研究合作
Research Collaboration

2023 年研究合作亮點

Research Collaboration Highlights in 2023

澳大積極推動、廣泛開展科研合作，大力拓展與產業界合作的深度與廣度，從而實現推動大學科技成果轉化、助力產業優化升級的目標。2023 年，大學與眾多優秀企業開展多種形式的產學研合作，包括共建聯合研發平台、共同申請政府資助的研究項目、開展聯合研發及委託開發等商業合作。在共建聯合研發平台方面，大學於 2023 年分別建立了多個粵港澳聯合實驗室及企業聯合實驗室等，以助力澳門產業適度多元發展；在共同申請政府資助的研究項目方面，大學通過聚焦國家戰略與經濟社會發展的重大需求，與眾多企業聯合申請內地及特區政府資助的研究項目，開展多領域的前沿科學聯合研究，2023 年有 37 個項目獲批立項，資助金額超過澳門幣 6,500 萬元；在委託開發方面，大學與廣州白雲山奇星藥業有限公司開展了藥學領域上的委託開發合作，以此推動產學研深度融合，加快科研成果向現實生產力轉化。

In 2023, UM actively pursued extensive research collaboration, pushing forward to broaden and deepen the cooperation with various industrial sectors. This expansion is aimed at driving the research output transfer and providing support for the optimisation and upgrade of various industries. Throughout the year, the University embarked on a range of industry-university-research initiatives with a number of top enterprises. These initiatives include the establishment of joint R&D platforms, joint application for government-funded research projects, and joint R&D projects and commissioned development projects with industry partners. In 2023, UM successfully established several Guangdong-Hong Kong-Macao joint laboratories and university-enterprise joint laboratories to facilitate the development of Macao's appropriate economic diversification. In addition, the University collaborated with various enterprises to apply for projects funded by the mainland and the SAR government. These projects align with the major needs of the national strategy, as well as the economic and social development, focusing on cutting-edge sciences across various fields. In 2023, a total of 37 projects received approval with a funding amount of over MOP 65 million. Regarding commissioned development projects, UM has initiated a partnership in the pharmaceutical area with Guangzhou Baiyunshan Qixing Pharmaceutical Co., Ltd. It has promoted the in-depth integration of industry-university-research and accelerated the translation of research results into the market.

2023 年新成立的合作聯盟

Newly Established Cooperation Alliances in 2023

數字電網技術裝備現代產業鏈創新聯盟

數字電網技術裝備現代產業鏈創新聯盟致力於推動能源產業與數字經濟融合，圍繞能源數字化轉型重大共性問題，立足數字電網建設發展需求，聚合各方優勢資源，達成數字電網建設共識，打造行業協同發展創新共同體，推動能源行業與數字經濟融合，建設電力設備產業創新高地，推動實現能源電力科技高水平自立自強，助力能源行業高質量發展和產業升級。

IMT-2030（6G）推進組

IMT-2030（6G）推進組旨在搭建政產學研用交流合作平台， 以集中各方力量聯合開展 6G 的推進工作，包括制定發展戰略和推進策略、開展 6G 需求、技術、標準、頻譜和知識產權等方面的研究，推動國際交流與合作。

電力行業人工智能聯盟

電力行業人工智能聯盟緊密圍繞促進電力行業智能化轉型、帶動人工智能產業發展目標、助力電力行業人工智能應用建設、電力行業人工智能生態構建、電力行業人工智能創新體系升級。在政府相關政策指引下，聯盟將充分發揮各方優勢資源，推動人工智能技術更好地融入數字電網建設，支撐構建新型電力系統，促進雙碳目標實現。

廣東省新型儲能產業技術創新聯盟

廣東省新型儲能產業技術創新聯盟是由新型儲能領域相關單位及機構，以產業發展需求和各方共同利益為基礎，以提升創新能力為目標，以具有法律約束力的契約為保障，建立的聯合開發、優勢互補、利益共享、風險共擔的創新合作組織和跨行業、開放性、非營利的科技服務平台。

粵港澳大灣區生產力促進服務聯盟

粵港澳大灣區生產力促進服務聯盟以打造創新服務高端樞紐平台，提升企業綜合競爭力，促進產業轉型升級，加快大灣區經濟發展為宗旨，聚焦粵港澳大灣區創新發展，充分發揮粵港澳三地生產力促進機構各自優勢，致力於深化三地創新服務交流合作，不斷提升區域合作層次和水平，攜手打造「粵港澳創新服務協作圈」，實現「資源共享、優勢互補、協同發展、合作共贏」。

Modern Industrial Chain Innovation Alliance of Digital Power Grid Technical Equipment

The Modern Industrial Chain Innovation Alliance of Digital Power Grid Technical Equipment is dedicated to advancing the convergence of the energy sector and the digital economy. Focusing on major common issues of energy digital transformation, the Alliance orients to needs of digital grid development. It leverages the advantageous resources of all parties, reaches a consensus on digital grid development, and creates a collaborative community for this industry. The Alliance not only promotes the integration of the energy industry and the digital economy, but also builds an innovation hub for the power equipment industry. It aims to promote high-level self-reliance in energy and power technology, and contribute to the high-quality development and industrial upgrading of the energy industry.

IMT-2030 (6G) Promotion Group

The IMT-2030 (6G) Promotion Group aims to build a platform for exchange and cooperation among government, industry, academia and research. It leverages the strengths of all parties to jointly carry out 6G promotion work, including formulating development and promotion strategies. In addition, it conducts research on 6G needs, technologies, standards, spectrums and intellectual property rights, and promote international exchange and cooperation.

Power Industry Artificial Intelligence Alliance

The Power Industry AI Alliance is committed to promoting the digital evolution of power industry, driving AI development, fostering AI application, creating an AI ecosystem, and upgrading the AI innovation system within the power industry. Aligned with governments' related policies, it aims to leverage resources from all parties to enhance AI's role in digital grid infrastructure, support new power system development, and contribute to the achievement of carbon peaking and carbon neutrality goals.

Greater New Energy Storage Technology Innovation Alliance of Guangdong Province

The Greater New Energy Storage Technology Innovation Alliance of Guangdong Province was established through the collaboration of relevant units and institutions in the new energy storage technology field. This alliance aims to enhance its innovation capabilities by addressing industry development needs and promoting the common interests of all participating parties. With a legally binding agreement in place, the Alliance functions as a platform for innovative cooperation. It facilitates joint research and development activities, leveraging the strengths of each member, and sharing both interests and risks. Furthermore, the Alliance serves as a technological service platform, promoting cross-industry collaboration, openness, and operating on a non-profit basis.

Guangdong-Hong Kong-Macao Greater Bay Area Productivity Service Alliance

The Guangdong-Hong Kong-Macao Greater Bay Area Productivity Service Alliance is dedicated to building a high-end hub platform for innovation services, enhancing the overall competitiveness of enterprises, promoting industrial upgrading, and accelerating the economic development of the Greater Bay Area. It focuses on the innovation and development of the Guangdong-Hong Kong-Macao Greater Bay Area and gives full play to the strengths of productivity service institutions within the region. Committed to deepening the exchange and cooperation in innovation services among Guangdong, Hong Kong and Macao and promoting regional cooperation, the Alliance is building a "Guangdong, Hong Kong and Macao Innovation Service Collaborative Circle" to realise the goal of "sharing resources, leveraging strengths, integrating development, and fostering win-win cooperation."

2023 年新建聯合實驗室

Newly Established Joint Laboratories in 2023

澳門大學—海思模擬技術創新實驗室

通過共同建設「澳門大學—海思模擬技術創新實驗室」，澳門大學與華為技術投資有限公司共同打造核心科技的創新工程體系、科技創新載體和平台。雙方以共建創新實驗室為抓手，開展在芯片設計、模擬與混合信號、集成電路、微電子研發等技術研究領域上的全面合作，助力澳門及大灣區產業經濟適度多元化發展。

澳門大學—津藥達仁堂中華醫藥創新聯合實驗室

澳門大學—津藥達仁堂中華醫藥創新聯合實驗室旨在開展中華醫藥創新研發等多領域的全面合作，助力澳門產業適度多元化，助力澳門中醫藥產業轉型升級。聯合實驗室主要研究方向包括名優中成藥的創新製劑研究、名優中成藥或1類創新中藥的原始創新探索研究、中成藥澳門註冊共性技術研究等。

澳門大學—數說故事通用人工智能聯合實驗室

澳大與廣東橫琴數說故事信息科技有限公司協同建設「澳門大學—數說故事通用人工智能聯合實驗室」，開展通用人工智能等多領域的全面合作，孵化優質產業項目，開展創新高端科研人才培養，建立長期、緊密、穩定的校企戰略合作關係，助力澳門產業適度多元化，助力大數據與人工智能產業轉型升級。聯合實驗室合作研發內容為跨模態的通用智能技術以及在可控視覺數據生成、智能感知等領域的應用及超大規模計算實現方案。

統計學與交叉研究開放實驗室

統計學與交叉研究開放實驗室重點圍繞生命健康、海洋科學、社會科學、數字經濟等領域開展交叉研究與數據合作，促進上述領域在企業應用層面的創新發展及成果交流。利用該實驗室在共同關注的統計學與交叉研究領域資源共享，建立有效合作互動機制，推動全面合作。合作內容包括但不限於項目申請、數據和科研成果共享、科研成果轉化等領域。

粵港澳毫米波與太赫茲聯合實驗室

粵港澳毫米波與太赫茲聯合實驗室匯集高校科研力量及資源優勢，打造毫米波與太赫茲技術領域三地聯合科研及人才培養的高端平台。聯合實驗室將面向6G衛星互聯網技術需求，聚焦衛星互聯網前端相控陣系統開展研究，主要包括毫米波與太赫茲核心芯片器件、毫米波與太赫茲天綫、面向衛星互聯網應用的毫米波相控陣集成系統，突破關鍵技術並與龍頭企業深度合作推進轉化應用，推動粵港澳地區衛星互聯網產業快速發展。

粵港澳中藥藥效物質基礎與創新藥物研究聯合實驗室

粵港澳中藥藥效物質基礎與創新藥物研究聯合實驗室旨在整合粵港澳大灣區在中藥藥效物質基礎與創新藥物研究領域的人才和技術資源，充分發揮粵港澳三地優勢，形成合力，推動大灣區中藥現代化、產業化與醫藥創新科技的快速發展，助力粵港澳大灣區建設及國家「一帶一路」合作倡議的實施，促進中醫藥創新科技發展和走向世界。

粵港澳新藥篩選聯合實驗室

粵港澳新藥篩選聯合實驗室將依據兩岸三地的資源優勢、地緣優勢，圍繞嚴重危害人類健康的重大疾病，如病毒性傳染病、炎症與腫瘤免疫、神經精神性疾病、肝臟疾病等四類疾病，確定關鍵分子靶點，開展新靶點新機制研究、規模化藥物篩選和成藥性評價。

University of Macau-Hisilicon Analog Technology Innovation Laboratory

Through the establishment of the University of Macau-Hisilicon Analog Technology Innovation Laboratory, UM and Huawei Tech. Investment Co., Limited will jointly build an innovative engineering system, technological innovation carrier and platform for core technologies. Both sides take the joint establishment of the Innovation Laboratory as the starting point for comprehensive cooperation in the areas of chip design, analog and mixed signal, integrated circuits, microelectronics research and development to facilitate the development of appropriate economic diversification in Macao and the Greater Bay Area.

University of Macau-Tianjin Pharmaceutical Da Ren Tang Joint Laboratory for Innovation of Chinese Medicine

The University of Macau-Tianjin Pharmaceutical Da Ren Tang Joint Laboratory for Innovation of Chinese Medicine aims to carry out comprehensive cooperation in various fields to promote innovative research and development of Chinese medicine. It contributes to Macao's appropriate economic diversification as well as the transformation and upgrading of Macao's Chinese medicine industry. The main research directions of the Joint Laboratory include research on innovative preparations of famous Chinese Proprietary Medicines, research on original innovation of famous Chinese Proprietary Medicines or Class 1 innovative Chinese medicines, and research on common technologies for Chinese Proprietary Medicine registration in Macao.

University of Macau-Datastory Joint Laboratory of Artificial General Intelligence

UM and Guangdong Hengqin Datastory Information Technology Co., Ltd. jointly established the University of Macau-Datastory Joint Laboratory of Artificial General Intelligence to forge comprehensive cooperation regarding general artificial intelligence. The Joint Laboratory is also committed to incubating high-quality industrial projects and nurturing innovative high-end research talents. It hopes to establish a long-term, close and stable strategic partnership between the university and the company, contribute to Macao's appropriate economic diversification, and assist in the transformation and upgrading of the big data and artificial intelligence industries. The Joint Laboratory will focus on cross-modal general intelligence technology and its application in the fields of controllable visual data generation, intelligent sensing as well as the realisation scheme of ultra-large-scale computation.

STAT+X Open Laboratory

The STAT+X Open Laboratory focuses on cross-disciplinary research and data cooperation in the fields including life and health, ocean science, social sciences and digital economy. It also promotes the innovative development and the application of research results in these fields. Leveraging its resources, the Open Laboratory aims to establish a robust cooperation and interaction framework and enhance comprehensive collaboration. The cooperation directions include project funding application, data and research results sharing, and research results transfer.

Guangdong-Hong Kong-Macao Joint Laboratory of Millimeter-Wave and Terahertz

The Guangdong-Hong Kong-Macao Joint Laboratory of Millimeter-Wave and Terahertz has leveraged the research advantages and resources of the universities to build a high-end platform for regional joint research and talent training in the field of millimeter wave and terahertz technology. The Joint Laboratory orients to the needs of 6G satellite Internet and focuses on the research of front-end phased array systems for satellite Internet. Research directions include core chip devices in millimeter-wave and terahertz, millimeter-wave and terahertz antennas, and millimeter-wave phased array integrated system for satellite Internet applications. It aims to facilitate the key technologies and promoting their transfer and application through in-depth cooperation with leading enterprises. Furthermore, it contributes to advance the rapid development of the satellite Internet industry in Guangdong, Hong Kong and Macao.

Guangdong-Hong Kong-Macao Joint Laboratory for Therapeutic Material Basis and Innovative Drug Research of Chinese Medicine

The Guangdong-Hong Kong-Macao Joint Laboratory for Therapeutic Material Basis and Innovative Drug Research of Chinese Medicine aims to integrate the talents and technological resources of Guangdong, Hong Kong and Macao in these fields. It fully utilises the advantages of Guangdong, Hong Kong and Macao to form a synergy to promote the rapid development of modernisation and industrialisation of Chinese medicine as well as innovative technologies related to Chinese medicine in the region. It is committed to contributing to the development of the Guangdong-Hong Kong-Macao Greater Bay Area and supporting the implementation of China's "Belt and Road" Initiative. In addition, the Joint Laboratory promotes the advancement of innovative technologies of Chinese medicine and their global recognition.

Guangdong-Hong Kong-Macao Joint Laboratory for New Drug Screening

The Guangdong-Hong Kong-Macao Joint Laboratory for New Drug Screening is dedicated to addressing major diseases that pose significant threats to human health, such as viral infectious diseases, inflammation and tumor immunity, neuropsychiatric diseases, and liver diseases. It strives to leverage the resources and geographical advantages of the mainland, Taiwan, Hong Kong and Macao in identifying key molecular targets, carrying out research on new targets and mechanisms, large-scale drug screening and druggability evaluation.

活動與訪問
Events and Visits

澳大學人研究講壇

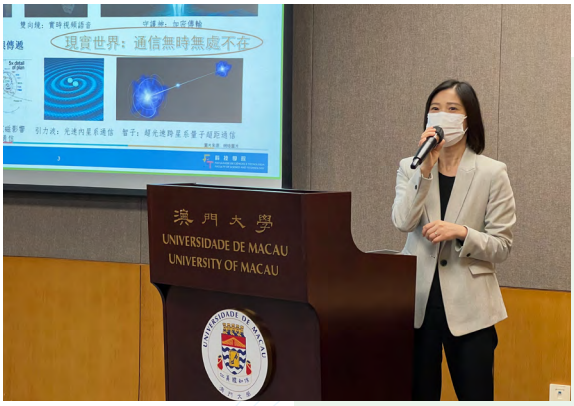
UM Scholar Research Forum

馬少丹分享移動通信技術如何改變人類社會

Shaodan Ma Gives Talk on How Mobile Communication Technology Can Change the World

「澳大學人研究講壇」之第十講於2023年2月14日舉行，由科技學院教授、智慧城市物聯網國家重點實驗室（澳門大學）副主任馬少丹以「移動通信—改變世界的奇妙魔法」為題發表演說。講座上，馬少丹從人類基本的通信需求出發，通過技術變革和應用需求兩方面介紹了移動通信技術的發展演變歷程。

The 10th lecture of the UM Scholar Research Forum was held on 14 February 2023. Shaodan Ma, professor of the Faculty of Science and Technology and associate director of the State Key Laboratory of Internet of Things for Smart City (University of Macau), held a talk titled “Mobile Communication: An Amazing Magic Changing the World”. During the talk, Professor Ma discussed the development and evolution of mobile communication technology from the basic communication needs of human beings to both technical changes and applications.



馬少丹教授
Professor Shaodan Ma

陳修平分享鐵元素對維生素 C 抗癌影響

Xiuping Chen Gives Talk on How Iron Affects Anti-Cancer Effects of Vitamin C

「澳大學人研究講壇」之第十一講於2023年3月14日舉行，由中華醫藥研究院教授陳修平以「鐵：維生素C抗腫瘤的搗蛋鬼」為題發表演說。陳修平詳細講解了鐵元素這個「搗蛋鬼」如何影響維生素C抗癌，及其為抗癌研究帶來的挑戰。

The 11th lecture of the UM Scholar Research Forum was held on 14 March 2023. Xiuping Chen, professor of the Institute of Chinese Medical Sciences, held a talk titled “Iron: The Troublemaker of Vitamin C in Cancer Therapy”. He discussed how iron becomes the troublemaker of vitamin C’ s anti-cancer effect and the challenges it brings to anti-cancer research.

陳修平教授
Professor Xiuping Chen

蔡天驥分享大數據如何改變社會科學研究
Tianji Cai Gives Talk on How Big Data Has Changed Social Science Research

「澳大學人研究講壇」之第十二講於2023年4月18日舉行，由社會科學學院副院長、教授蔡天驥以「大數據時代，社會科學家在做什麼？」為題發表演說。講座上，蔡天驥通過介紹一系列社會科學家利用大數據工具得出的研究成果，生動地講述了大數據技術如何改變社會科學。

The 12th lecture of the UM Scholar Research Forum was held on 18 April 2023. Tianji Cai, associate dean and professor of the Faculty of Social Sciences, delivered a talk titled "What Does a Social Scientist Do in the Era of Big Data?" During the talk, Professor Cai provided a vivid account of how big data changed social science research by presenting a series of research results from social scientists using big data tools.

蔡天驥教授
Professor Tianji Cai

莫昇萍分享 AI 在醫學影像的最新應用
Greta Seng Peng Mok Gives Talk on Latest AI Applications in Medical Imaging

「澳大學人研究講壇」之第十三講於2023年9月14日舉行，由科技學院教授莫昇萍以「醫學影像多角度，從X光到人工智能（AI）」為題發表演說。講座上，莫昇萍生動地講述了醫學成像的起源和最新發展，並介紹了常見的臨床醫學成像方式。莫昇萍還特別分享了AI技術在醫學影像中的最新發展，以及醫學成像在澳門的應用。

The 13th lecture of the UM Scholar Research Forum was held on 14 September 2023. Greta Seng Peng Mok, professor of the Faculty of Science and Technology, delivered a talk titled "Viewing Medical Imaging in Multiple Angles – From X-ray to Artificial Intelligence (AI)". During the talk, Professor Mok discussed the origins and latest development in medical imaging and presented common clinical medical imaging modalities. She also talked about the latest development in AI technology in the field of medical imaging, and the application of medical imaging in Macao.

莫昇萍教授
Professor Greta Seng Peng Mok

汪超分享專利及澳門仲裁調解制度
Chao Wang Gives Talk on Patents and Macao's Dispute Resolution System

「澳大學人研究講壇」之第十四講於2023年10月24日舉行，由法學院教授汪超以「專利制度、國際貿易與個人權利的相互關係及澳門仲裁和調解制度的新發展」為題發表演說。講座上，他講解了有關專利保護制度及多邊國際貿易協定在經濟活動當中的重要性，並指出相關制度規則與個人生活之間的密切關聯及它們對個人權利保護的積極和消極意義。他還分享了其基於問卷調查和訪談方法的發現，並根據澳門的實際情況設計、適合本地特點的仲裁和調解制度。

汪超教授
Professor Chao Wang

The 14th lecture of the UM Scholar Research Forum was held on 24 October 2023. Chao Wang, professor of the Faculty of Law, delivered a talk titled "The Linkage between Patents, Trade, and Human Rights & Macau's Local Legal Development on Arbitration and Mediation". The first topic revolved around the linkage between patents, trade and human rights. Professor Wang explained the importance of the patent protection system and multilateral international trade agreements in economic activities, as well as their positive and negative implications on human rights protection. The second topic was about the legal development of arbitration and mediation in Macao. Professor Wang shared his empirical research on developing a dispute resolution system that meets Macao's actual circumstances and conditions.

李鵬分享現代科技如何為中藥安全護航
Peng Li Gives Talk on How Modern Technology Ensures Safety of Chinese Medicines

「澳大學人研究講壇」之第十五講於2023年11月24日舉行，由中華醫藥研究院副院長（研究及技術轉移）、教授李鵬以「用現代科技築起中藥安全的第一道防線」為題發表演說。講座上，李鵬向觀眾詳細講解了影響中藥安全的主要因素，並介紹如何運用現代科技手段保障中藥的安全性。

李鵬教授
Professor Peng Li

The 15th lecture of the UM Scholar Research Forum was held on 24 November 2023. Peng Li, deputy director (research and technology transfer) and professor of the Institute of Chinese Medical Sciences, delivered a talk titled "Building the First Line of Defense for the Safety of Chinese Medicines with Modern Technology". During the talk, Professor Li gave a detailed explanation of the main factors affecting the safety of Chinese medicines and presented how modern technologies can be used to ensure the safety of Chinese medicines.

展會活動

Exhibitions

內地與澳門產學研合作路演對接會

The Industry-University-Research Collaboration Roadshow and Matching Session between Mainland and Macao

內地與澳門產學研合作路演對接會
The Industry-University-Research Collaboration Roadshow and Matching Session between Mainland China and Macao

「內地與澳門產學研合作路演對接會」於2023年5月23日在廣州成功舉行。此次活動以「生物醫藥及中醫藥」等大健康領域為主題，澳大8組科研團隊攜其具轉移轉化前景的科研成果赴穗參會，與40家來自廣東、陝西、安徽及天津等地區的科技企業及創投機構進行70場次對接洽談，高效達成11項合作意向。

The Industry-University-Research Collaboration Roadshow and Matching Session between Mainland and Macao was successfully held in Guangzhou on 23 May 2023. In line with the theme of “Biomedicine and Traditional Chinese Medicine”, eight research teams from UM joined the event and presented their research outputs which had good market potential for knowledge transfer. At the event, there were 70 business negotiation meetings with 40 hi-tech enterprises and venture capital institutions from Guangdong, Shaanxi, Anhui and Tianjin, and 11 letters of intent for cooperation were signed.

第九屆中國（上海）國際技術進出口交易會
The 9th China (Shanghai) International Technology Fair

為進一步推廣澳門大學的優秀科研成果，澳大代表團於2023年6月15日-17日攜三項科研成果赴滬出席「第九屆中國（上海）國際技術進出口交易會」。期間，代表團受邀出席由澳門貿易投資促進局主辦的「‘共用機遇、共建科技新生態’澳門科技投資推介會」，與來自華東地區的科技企業和機構進行面對面的溝通交流，進而實現大學科研成果產業化。

A delegation from UM attended the 9th China (Shanghai) International Technology Fair (CSITF) from 15 to 17 June 2023. Three UM research teams promoted their research outputs at CSITF in exploring industry-university-research collaboration. In addition, the delegation was invited to participate in the “‘Sharing Opportunities, Building New Technologies’ Macao Science and Technology Investment Promotion Conference” hosted by the Macao Trade and Investment Promotion Institute. The event allowed face-to-face communication with scientific and technological enterprises and institutions in East China to facilitate the industrialisation of research results of the University.

中華醫藥研究院余華副教授（右）與企業代表對接洽談
Professor Hua Yu (right) from the Institute of Chinese Medical Sciences had a negotiation meeting with an enterprise representative

2023 年澳門國際環保合作發展論壇及展覽
The 2023 Macao International Environmental Co-operation Forum and Exhibition (2023 MIECF)

2023年8月17日-20日，澳大四項科研成果於「2023年澳門國際環保合作發展論壇及展覽」展出，獲一眾嘉賓和與會者關注及好評，並成功與多家企業有效對接。是次展出的澳大科研成果包括：一、科技學院助理教授郝天偉及研究助理教授錢光升研發的「揮發性有機酸（VFA）& 鹼度在線監測系統」；二、科技學院助理教授張平研發的「一種快速檢測燃料電池的氧氣計量比演算法」；三、響應國家「雙碳」號召，澳大智慧城市物聯網國家重點實驗室創業團隊——希畝（SEM）團隊開發的「即插即用、易改造和高可信的室內能源管理系統」；四、澳大鄭裕彤書院創業團隊創立的澳門寵物紀元有限公司研發的「環保麥芽貓砂」。

研究團隊展示研究成果
A research team presented their research project

Four research projects from the University of Macau (UM) were exhibited at the 2023 Macao International Environmental Co-operation Forum and Exhibition from 17 to 20 August 2023 and were well received by many guests and attendees. The research projects exhibited included: (1) a novel real-time automatic VFA & alkalinity analyser developed by Assistant Professor Tianwei Hao and Research Assistant Professor Guangsheng Qian from the Faculty of Science and Technology (FST); (2) a rapid diagnostic method for monitoring oxygen stoichiometry in proton exchange membrane fuel cells developed by Assistant Professor Ping Zhang from FST; (3) a plug-and-play, easy-to-modify and high-reliability indoor energy management system developed by an entrepreneurial team - Smart Energy in Macao (SEM) from the State Key Laboratory of Internet of Things for Smart City (UM); and (4) Macau BioPeTech eco-friendly BSG cat litter developed by the BioPETech Company Limited from Cheng Yu Tung College of UM.

博鰲亞洲論壇國際科技與創新論壇第三屆大會 - 海洋科技：走向「藍色」可持續發展分論壇

The Third Conference of the International Science, Technology and Innovation Forum (ISTIF) of Boao Forum for Asia (BFA) - the Parallel Session on Marine Science and Technology: towards “Blue” Sustainable Development

「博鰲亞洲論壇國際科技與創新論壇第三屆大會」於珠海舉行，其中澳大2023年9月21日協辦了「海洋科技：走向『藍色』可持續發展」分論壇，多名學者圍繞海洋經濟、海洋可持續利用、海洋生態和污染、海洋裝備和工程等方面開展深度討論。

The Third Conference of the International Science, Technology and Innovation Forum (ISTIF) of Boao Forum for Asia (BOA) took place in Zhuhai. UM co-organised a parallel session on “Marine Science and Technology: towards ‘Blue’ Sustainable Development” on 21 September 2023. During the event, several scholars had in-depth discussion on marine economy, sustainable utilisation of marine resources, marine ecology and pollution, and marine equipment and engineering.

海洋科技：走向「藍色」可持續發展分論壇
The parallel session on “Marine Science and Technology: towards ‘Blue’ Sustainable Development”

第九屆澳門工展會
The 9th Macau Industrial Products Show

「第九屆澳門工展會」於2023年9月29日至10月2日舉行，澳大18項科研及孵化成果在展會期間集中亮相，吸引一眾嘉賓的濃厚興趣並給予肯定，充分展示澳大近年在科研創新及成果轉化方面取得的成績。

The 9th Macau Industrial Products Show was held from 29 September to 2 October 2023. A total of 18 research projects developed and incubated by UM were showcased, attracting great interest from guests and demonstrating the University's recent achievements in research innovation and the commercialisation of research results.

澳大團隊向行政長官賀一誠等一眾嘉賓介紹成果
A UM team introduced their research project to Chief Executive Ho Iat Seng and other guests

2023 科技周暨創科成果展
Science and Technology Week 2023 cum Exhibition of Achievements in Science and Technology Innovation

澳大多項科研成果於「2023科技周暨創科成果展」展出，涉及生物醫藥及中醫藥、信息通訊與集成電路、節能環保、新材料與先進製造等領域，受到與會嘉賓的高度關注。澳大有21個科研項目和11家孵化企業參加「創科成果展」，並有18項科研成果在「內地與澳門產學研合作路演對接會」進行路演展示，期間與多家科技企業進行有效對接，共簽署了36份合作意向書。此外，澳大77個科研項目亦在「2022年度科研項目結題展暨學術報告會」展出。

UM showcased a number of research results at the "Science and Technology Week 2023 cum Exhibition of Achievements in Science and Technology Innovation". The research results covered various fields, including biomedicine and Chinese medicine, information and communication and integrated circuits, energy conservation and environmental protection, and new materials and advanced fabrication, attracting great attention from the participating guests. A total of 21 UM research projects and 11 UM start-up companies participated in the "Exhibition of Achievements in Science and Technology Innovation". Among them, 18 research projects were presented at the "Roadshow and Session of Exchange of Contacts of

「2022 年度科研項目結題展暨學術報告會」開幕儀式
The Opening Ceremony of the "Scientific Research Projects Result Exhibition and Academic Report in Year of 2022"

Industry-University-Research Cooperation between Mainland China and Macao". Business relationship were established with several technology companies, and 36 letters of intent were signed. In addition, UM exhibited 77 research projects at the "Scientific Research Projects Result Exhibition and Academic Report in Year of 2022".

參訪交流

Visits and Exchange

中央人民政府駐澳門特別行政區聯絡辦公室副主任黃柳權率團訪問澳門大學。
A delegation led by Liuquan Huang, deputy director of the Liaison Office of the Central People's Government in the Macao SAR visited UM.

2023.02.24

廣州市科協黨組書記徐柳率團參訪澳門大學。
A delegation led by Liu Xu, secretary of the leading party members' group of the Guangzhou Association for Science and Technology visited UM.

2023.03.10

2023.03.15

澳門工程師學會會長兼立法會議員胡祖杰率團參訪澳門大學。
A delegation led by Chou Kit Wu, chairman of the Macau Institute of Engineers and member of the Legislative Assembly, visited UM.

復旦大學校長、中國科學院院士金力率代表團訪問澳門大學。
A delegation led by Li Jin, president of Fudan University and an academician of the Chinese Academy of Sciences (CAS), visited UM.

2023.03.31

第十四屆全國政協常委、人口資源環境委員會副主任、國家電力投資集團董事長錢智民率團訪問澳門大學。
A delegation led by Zhimin Qian, a standing committee member of the 14th National Committee of the Chinese People's Political Consultative Conference (CPPCC), deputy director of the Population, Resources and Environment Committee of the CPPCC, and chairman of the State Power Investment Corporation, visited UM.

2023.04.03

中國科學院院士、清華大學人工智能研究院創建兼名譽院長張鈸率團訪問澳門大學。
A delegation led by Bo Zhang, an academician of the Chinese Academy of Sciences, the founding and honorary dean of the Institute for Artificial Intelligence at Tsinghua University, visited UM.

2023.04.11

2023.05.10

中國科學技術協會主席萬鋼率團訪問澳門大學。
A delegation led by Gang Wan, president of the China Association for Science and Technology, visited UM.

大灣區科學論壇秘書處代表團訪問澳門大學。
A delegation from the Secretariat of the Greater Bay Area Science Forum visited UM.

2023.07.07

2023.10.31

中國科學院院士、中國科學院半導體研究所研究員常凱參訪澳門大學。
A delegation led by Kai Chang, an academician of the Chinese Academy of Sciences (CAS) and a researcher at the Institute of Semiconductors of CAS, visited UM.

2023.10.27

國家自然科學基金委員會代表團參訪澳門大學。
A delegation from the National Natural Science Foundation of China visited UM.

國家科技部副秘書長、國務院參事賀德方率團訪問澳門大學。
A delegation led by Defang He, deputy secretary general of the Ministry of Science and Technology of China and a counsellor of the State Council, visited UM.

2023.11.21

香港城市大學海洋污染國家重點實驗室主任梁美儀率團參訪澳門大學。
Kenneth Mei Yee Leung, director of the State Key Laboratory of Marine Pollution (City University of Hong Kong), led a delegation to visit UM.

2023.12.12

2023.12.05

科學技術部黨組成員、國家自然科學基金委員會主任竇賢康率團訪問澳門大學。
Xiankang Dou, member of the CPC Leading Group of the Ministry of Science and Technology and president of the National Natural Science Foundation of China, led a delegation to visit UM.

2023.12.13

中國科學院副院長張亞平率團訪問澳門大學。
Yaping Zhang, vice president of the Chinese Academy of Sciences, led a delegation to visit UM.

數據資料
Facts and Figures

概況

General Information

創校時間：1981 年

Founded in: 1981

ESI 前 1% 學科數量：12 個

Number of research fields in ESI top 1%: 12

學校排名：

2023 年泰晤士高等教育世界大學排名

第 201-250 位

University ranking: THE 2023 #201-250

2023 年 Quacquarelli Symonds (QS) 世界大學排名

第 304 位

University ranking: QS World University Rankings 2023 # 304

註冊學生數量（2022/2023 學年）：

Number of registered students (2022/2023 Academic Year):

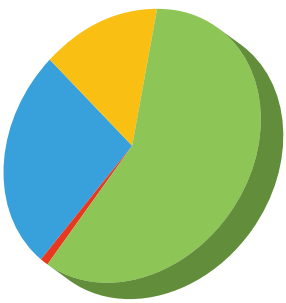
總人數：Total 12,666

博士 Ph.D. programmes 1,827

碩士 Master programmes 3,354

學士後 Post-Baccalaureate programmes 59

學士 Bachelor programmes 7,426



教學人員數量（截至 2023 年 12 月 31 日）：

Number of faculty members (as at 31 December 2023):

總人數：Total 646

講座教授 Chair Professor 24

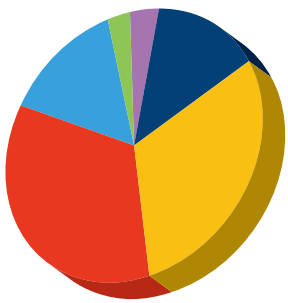
特聘教授 Distinguished Professor 18

教授 Full Professor 89

副教授 Associate Professor 225

助理教授 Assistant Professor 198

其他 Others 92



學院及研究院數量：14 個

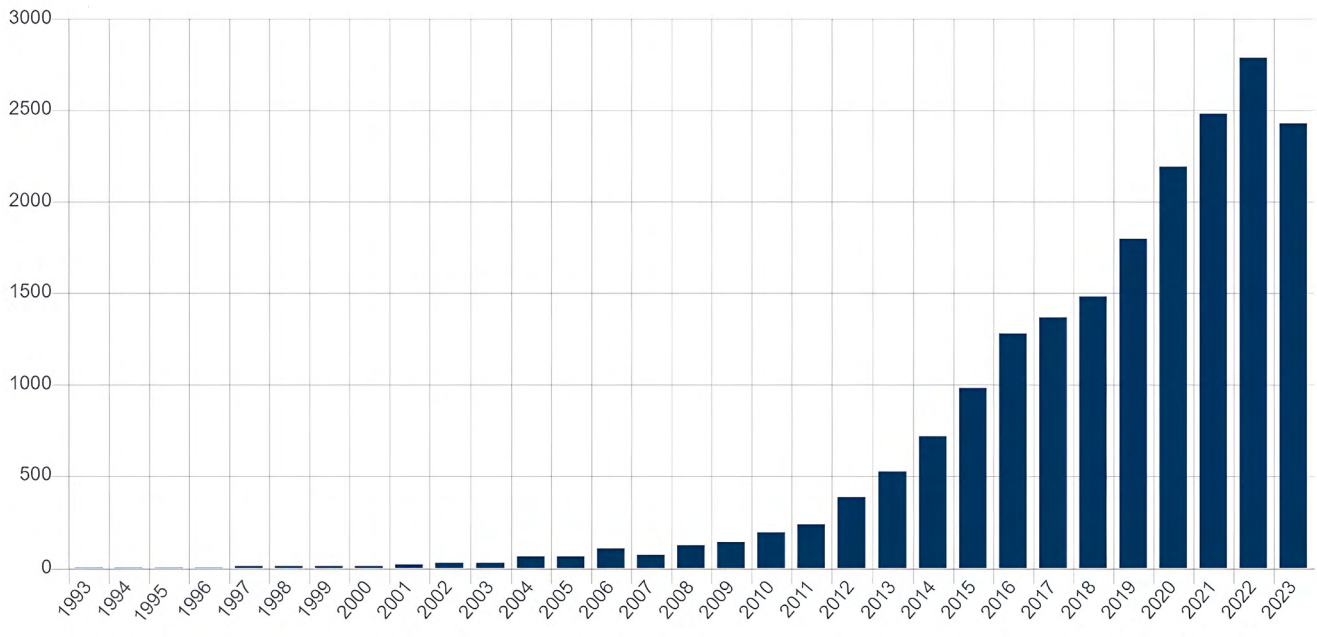
Number of faculties & institutes: 14

住宿式書院數量：10 個

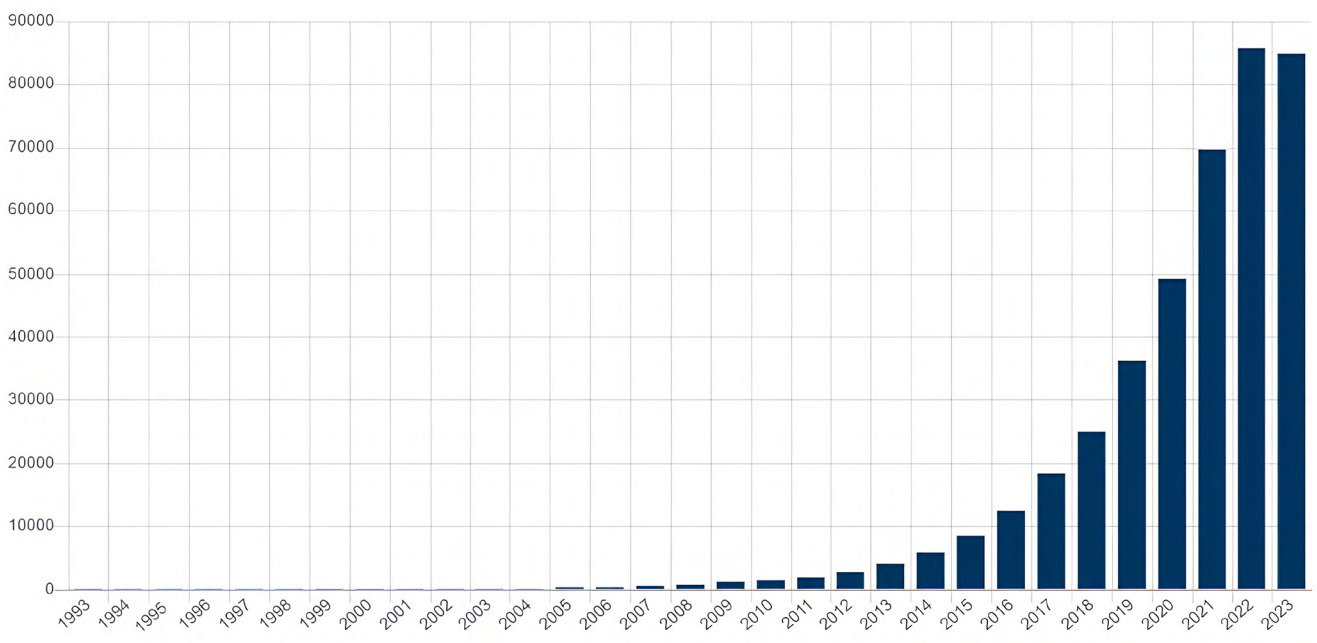
Number of residential colleges: 10

論文發表和被引用次數

Publications and Citations



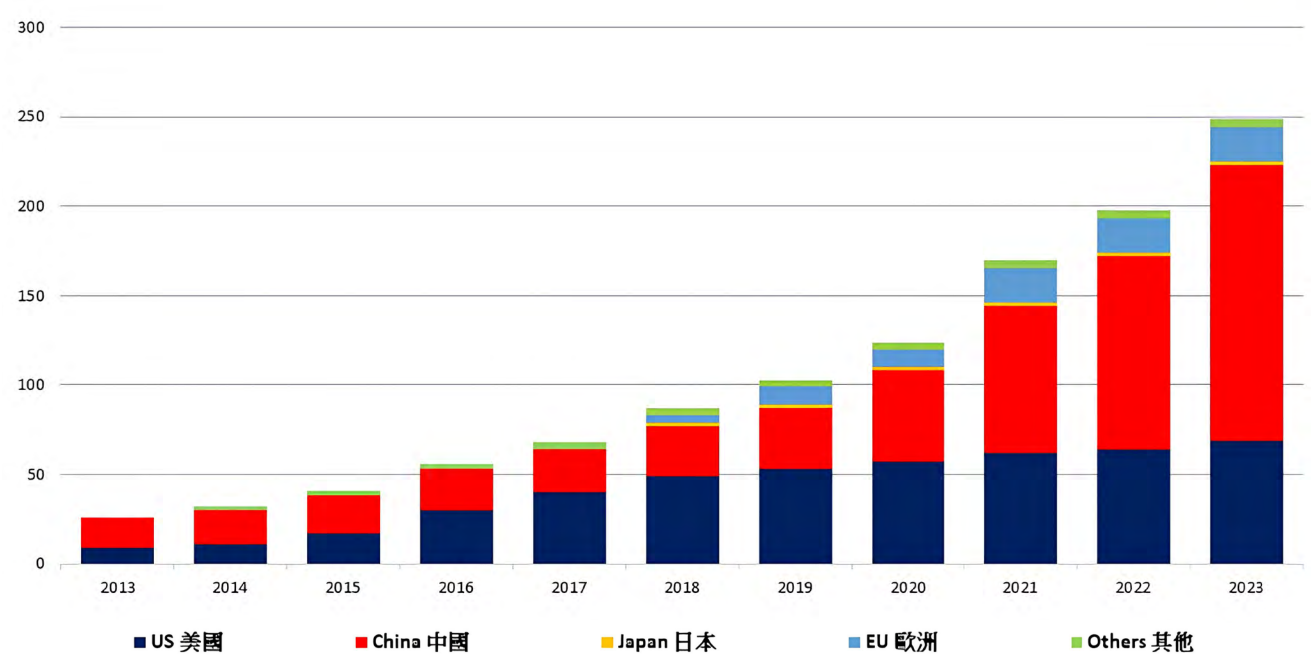
期刊論文發表數量（截至 2023 年 12 月 31 日）
Number of Published Journal Papers (as at 31 December 2023)



期刊論文被引用次數（截至 2023 年 12 月 31 日）
Citation Frequency of Journal Papers (as at 31 December 2023)

專利

Patents



Note:Includes inactive patents 註：包括已期滿之專利

專利數目（截至 2023 年 12 月 31 日）
Number of Patents (as at 31 December 2023)

2022/2023 學年獲批科研項目

2022/2023 Approved Research Projects

澳門大學研究委員會資助的研究項目總數：280　　總金額：澳門元 92,343,000

Total number of research projects approved by the UM Research Committee: 280, funding amount: MOP 92,343,000

澳門特別行政區科學技術發展基金資助的研究項目總數：91　　總金額：澳門元 142,909,000

Total number of research projects approved by Macao SAR FDCT: 91, funding amount: MOP 142,909,000

其他（包括內地、香港資助）項目總數：45　　總金額：澳門元 28,479,000

Total number of research projects approved by other funding organisations (including Mainland China and Hong Kong): 45, funding amount: MOP 28,479,000

澳大研究委員會

UM Research Committee

2023/2024 成員

2023/2024 Membership

	所屬單位 Affiliated Unit	姓名 Name
主席 Chair	副校長（研究） Vice Rector (Research)	葛偉 Prof. Wei GE
秘書 Secretary	研究服務及知識轉移辦公室主任 Director of RSKTO	王春明 Prof. Chunming WANG
成員 Member	人文學院 Faculty of Arts and Humanities	李德鳳 Prof. Defeng LI Prof. Damian John SHAW
	工商管理學院 Faculty of Business Administration	雷智豪 Prof. Raymond Chi Ho LOI 苗莉 Prof. Li MIAO
	教育學院 Faculty of Education	周明明 Prof. Mingming ZHOU 魏冰 Prof. Bing WEI
	健康科學學院 Faculty of Health Sciences	徐仁和 Prof. Renhe XU 張仲榮 Prof. Edwin Chong Wing CHEUNG
	法學院 Faculty of Law	魏丹 Prof. Dan WEI Prof. Teresa Lancry A.S. ROBALO
	社會科學學院 Faculty of Social Sciences	胡文詩 Prof. Anise Man Sze WU 蔡天驥 Prof. Tianji CAI
	科技學院 Faculty of Science and Technology	蔡小川 Prof. Xiao-Chuan CAI 祝雷 Prof. Lei ZHU
	研究生院 Graduate School	王百鍵 Prof. Pak Kin WONG
	應用物理及材料工程研究院 Institute of Applied Physics and Materials Engineering	湯子康 Prof. Zikang TANG
	中華醫藥研究院 Institute of Chinese Medical Sciences	陳新 Prof. Xin CHEN
	協同創新研究所 Institute of Collaborative Innovation	須成忠 Prof. Cheng-Zhong XU
	微電子研究院 Institute of Microelectronics	羅文基 Prof. Man Kay LAW
	模擬與混合信號超大規模集成電路國家重點實驗室（澳門大學）State Key Laboratory of Analog and Mixed-Signal VLSI (University of Macau)	冼世榮 Prof. Sai Weng SIN
	中藥質量研究國家重點實驗室（澳門大學） State Key Laboratory of Quality Research in Chinese Medicine (University of Macau)	李鵬 Prof. Peng LI
	智慧城市物聯網國家重點實驗室（澳門大學） State Key Laboratory of Internet of Things for Smart City (University of Macau)	馬少丹 Prof. Shaodan MA

RSKTO

研究服務及知識轉移辦公室
Gabinete de Apoio à Investigação e de Transferência de Conhecimento
Research Services and Knowledge Transfer Office