



麥健輝教授
Professor MAK Kin Fai

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Prof Mak Kin Fai is a distinguished physicist who believes that success in physics demands what he affectionally describes as a “bit of silliness”. In other words, to excel as a physicist one must not only possess the requisite intelligence but also the curiosity to chase down answers to difficult questions, the imagination to look beyond the obvious, and the perseverance to embrace a long journey of discovery. Prof Mak likens this process to being a marathon runner rather than a short distance sprinter. This is a particularly apt description of Prof Mak himself, as he is not only an accomplished physicist but also a dedicated runner who exercises daily to keep in shape both physically and mentally.

Born in Guangzhou and raised in Hong Kong from the age of 10, Prof Mak first developed a keen interest in physics during his secondary school years. An avid reader of popular books on the universe and relativity, he idolized Albert Einstein long before fully grasping his theories.

That early passion led to his decision to study physics and mathematics at The Hong Kong University of Science and Technology (HKUST). Although still a relatively young university at the time, HKUST attracted him with its international faculty, many of whom hailing from the United States—the “gold standard” in science and technology back then.

During his undergraduate years at HKUST, he was encouraged by his mentors to pursue his graduate studies in the United States. He then earned his PhD in physics from Columbia University, followed by a Kavli postdoctoral fellowship at Cornell University. He later joined Pennsylvania State University as an assistant professor, where he quickly established himself as a rising star in condensed matter physics, receiving recognitions such as the OCPA Outstanding Young Researcher Award.

Prof Mak then returned to Cornell and subsequently joined Germany’s prestigious Max Planck Institute for the Structure and Dynamics of Matter in Hamburg, where he serves as one of five directors, alongside his wife and fellow physicist, Prof Jie Shan.

The couple has been exploring one of the most fascinating frontiers in modern science: how billions and even trillions of electrons (the negatively charged particles that power our digital world) interact in two-dimensional materials, often in complex and unpredictable ways. From

麥健輝教授是一位優秀的物理學家，他深信科研之路須憑一股「傻勁」方能走得更遠。優秀的學者不僅需要具備聰明才智，更要有追根究柢的好奇心、跳脫框架的想像力和鍥而不捨的毅力。他比喻這段科研旅程為一場漫長的馬拉松，科研探索並非短跑衝刺，必須持之以恆，不畏艱辛。他本人正是每日鍛鍊不輟的長跑愛好者，藉此磨練身心，保持最佳狀態。

麥教授生於廣州，十歲時移居香港。中學時期初次邂逅物理學，被宇宙和相對論的奧妙深深吸引，手不釋卷，更視愛因斯坦為偶像。即使當時對浩瀚理論仍一知半解，卻已跟物理學結下不解之緣。

這份熱情驅使他選擇香港科技大學（科大）修讀物理和數學。當年科大雖屬新晉學府，卻擁有國際化師資，雲集來自美國科研界的頂尖學者，令麥教授視之為追尋科研新知的理想殿堂。

在科大求學期間，麥教授得到良師鼓勵，決定赴美深造。他負笈美國哥倫比亞大學攻讀物理學博士，隨後在康奈爾大學展開博士後研究，並在賓夕法尼亞州立大學擔任助理教授，迅速在凝聚態物理學界嶄露頭角，榮獲全球華人物理和天文學會頒發傑出青年科學家獎。

後來，麥教授重返康奈爾大學任教，繼而轉往德國發展，在享譽國際的馬克斯普朗克物質結構及動力學研究所獲任為其中五位所長之一，與同為物理學家的妻子單潔教授攜手領導研究所工作。

夫妻同心，二人專注探索科學的最前沿領域，研究數以十億甚至萬億電子在二維材料中的奇妙互動，這些帶負電粒子便是驅動數碼世界的動力來源。團隊又深入探討高溫超導、量子反常霍爾效應等現

this area of study, he and his team have begun to probe phenomena such as high-temperature conductivity and the Quantum anomalous Hall effect. The results of their research are expected to have far-reaching implications for advances in quantum computing, more efficient electronics and the next-generation semiconductors.

Much of Prof Mak's work lies within the realm of pure research, driven by curiosity even though it may not have immediate practical applications. About two decades ago while he was still in graduate school, he investigated a "magic material" called graphene—an atom-thin sheet of carbon with extraordinary conductivity. Although graphene conducts electricity better than copper, it does not allow the flow of electricity to be switched on and off, as in a transistor. Along with his fellow researchers, he wondered if another two-dimensional material might solve that problem. The discovery that molybdenum disulfide (MoS_2) could be a viable solution became a defining milestone in his career, paving the way for future advances in nanoelectronics.

Having authored over 100 peer-reviewed publications and garnered more than 60,000 citations, Prof Mak is widely respected for his contributions to condensed matter physics. Despite his many accolades including fellowships from the American Physical Society, the Packard Foundation and the Alfred P. Sloan Foundation, he remains remarkably grounded, approaching science with humility and a strong sense of purpose.

Looking ahead, he is optimistic about the future of physics, which he believes is inherently global. While cultures may differ, he notes that when scientists discuss physics, they are essentially speaking a common scientific language. He is also encouraged by the Country's growing role in science and technology, observing that it is making significant strides and meaningful contributions to global progress.

As an alumnus of HKUST, Prof Mak cherishes the formative years he spent on campus at the start of his academic career. He fondly recalls joining the band society, where he played guitar, and participating in lively study groups that fueled his passion for physics. Today, he is seeking opportunities to strengthen collaborations between the Max Planck Institute and universities in Hong Kong and the Mainland, especially HKUST, whose growth in physics, nanotechnology, and engineering he greatly admires.

HKUST is proud to honor Prof Mak Kin Fai in recognition of his pioneering research, global impact and continued contributions to the advancement of science.

象，其成果有望推動量子運算、高效電子技術及新一代半導體的突破性發展。

麥教授的研究多屬純粹科學範疇，雖未必能即時應用，他仍求知若渴地潛心研究。約二十年前，在其研究生時期，他便着手研究石墨烯，這種被譽為「魔法材料」的極薄碳材，雖然石墨烯的導電性遠勝銅，卻無法像電晶體般開關自如。為此，他與團隊致力尋覓另一種二維材料作為替代方案，最終在二硫化鉬 (MoS_2) 中找到答案，該發現成為他研究生涯中的一大重要里程碑，為納米電子技術發展開闢新途。

麥教授至今已發表逾百篇獲同行評審的論文，獲引用超過60,000次，在凝聚態物理學界享負盛名。他曾獲美國物理學會、帕卡德基金會及艾爾佛·斯隆基金會頒發院士榮銜，但始終保持謙遜，以務實的態度和使命感投身科學探索。

展望未來，他對物理學的前景充滿信心，堅信其本質是全球共通語言，即使文化各異，科學家討論物理學時總能心領神會。他也對中國在科技領域的迅速發展感到鼓舞，期盼中國能為全球科技進步發揮更大影響力。

作為科大校友，麥教授視科大為展開學術生涯的起點，非常珍重在母校的青蔥歲月，而且特別懷念在大學凝音社彈奏結他，以及與志同道合的朋友組成研習小組，分享對物理的熱愛。如今，他積極促進馬克斯普朗克研究所與香港及內地大學的合作，尤其是與母校科大的交流，並欣見科大在物理、納米科技及工程學領域發展蓬勃。

麥健輝教授的前瞻研究推動全球科學發展，發揮深遠且持續的影響力，科大謹此予以表揚。