

Acknowledgements

We would like to extend our sincere appreciation to our donors for their recent support, which is instrumental in our growth and pursuit of new achievements. Their generosity has been invaluable in propelling us to new heights. We would like to honour and acknowledge their contributions by listing the donors in alphabetical order, based on both organisation names and surnames.

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HKU SCIENCE COMMUNICATIONS

SCIENCE SPARKS²⁰₂₄

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**BRIDGING
SCIENCE AND
SOCIETY**



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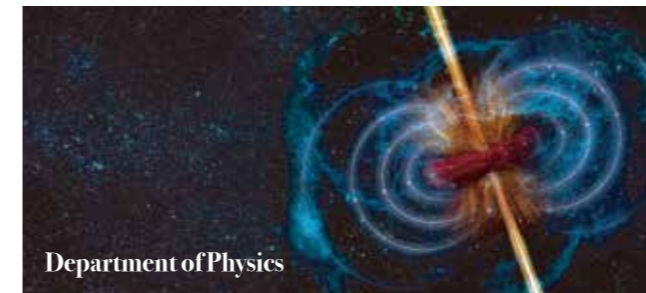
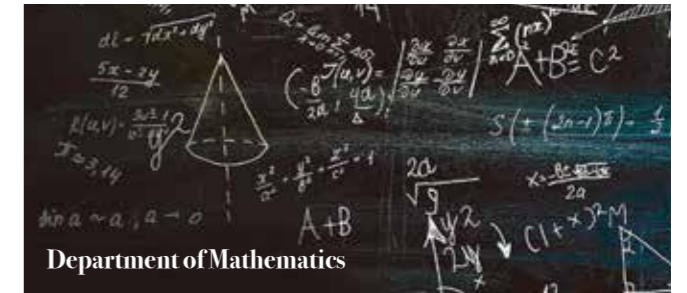


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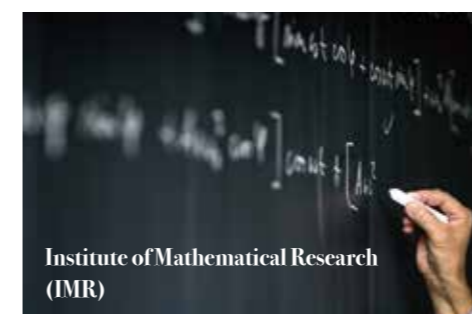
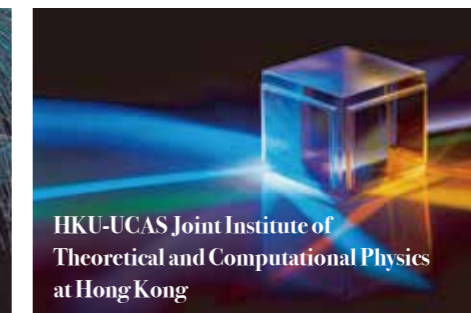
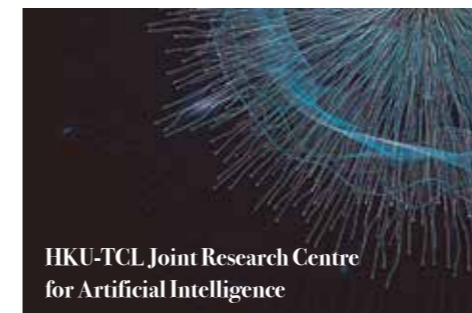


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Bachelor of Science & Master of Research (Science Master Class)	Bachelor of Arts and Sciences
Bachelor of Science and Bachelor of Laws (5-year Double Degree Programme)	Bachelor of Education and Bachelor of Science (5-year Double Degree Programme)
Bachelor of Science in Actuarial Science	

Taught Postgraduate Programmes

Master of Science in the field of Applied Geosciences	Master of Science in the field of Food Industry: Management & Marketing
Master of Science in Artificial Intelligence	Master of Science in the field of Food Safety & Toxicology
Master of Science in the field of Chemical Technologies for Health & Materials <small>NEW</small>	Master of Science in the field of Physics
Master of Data Science	Master of Statistics
Master of Science in Environmental Management	

Research Postgraduate Programmes

Master of Philosophy	Doctor of Philosophy
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INSTITUTIONAL REPUTATION & GLOBAL PRESENCE



HKU SCIENCE FAMILY

TEACHING STAFF

>180

UNDERGRADUATE STUDENTS

>2,760

RESEARCH POSTGRADUATE STUDENTS

~730

TAUGHT POSTGRADUATE STUDENTS

~850

ALUMNI

>28,000



UNIVERSITY RANKINGS

QS ASIA UNIVERSITY RANKINGS 2024

QS WORLD UNIVERSITY RANKINGS #2

QS WORLD UNIVERSITY RANKINGS 2024

QS WORLD UNIVERSITY RANKINGS #26

THE ASIA UNIVERSITY RANKINGS 2023

THE WORLD UNIVERSITY RANKINGS #4

THE WORLD UNIVERSITY RANKINGS 2024

THE WORLD UNIVERSITY RANKINGS #35



RANKINGS BY SCIENCE SUBJECTS

#43 THE WORLD UNIVERSITY RANKINGS



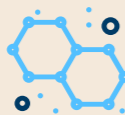
LIFE SCIENCES
(THE WORLD UNIVERSITY RANKINGS 2024)

#47 THE WORLD UNIVERSITY RANKINGS



PHYSICAL SCIENCES
(THE WORLD UNIVERSITY RANKINGS 2024)

#29 QS WORLD UNIVERSITY RANKINGS



LIFE SCIENCES & MEDICINE
(QS WORLD UNIVERSITY RANKINGS 2023)

#81 QS WORLD UNIVERSITY RANKINGS



NATURAL SCIENCES
(QS WORLD UNIVERSITY RANKINGS 2023)

TOP-NOTCH SCHOLARS

18.3% of professorial staff are the world's top 1% Highly Cited Researchers (Clarivate Analytics' Essential Science Indicators for the past decade)

1 Nobel Laureate

6 Members of Chinese Academy of Sciences (CAS)

8 Memberships of Foreign Academies

4 Members of Hong Kong Academy of Sciences

23 Croucher Foundation Senior Research Fellows

RESEARCH EMINENCE

6 Areas of Excellence (AoE) projects

2 Theme-based Research (TRS) projects

1 State Key Laboratory

3 HKU-CAS Joint Laboratories

2 Government's InnoHK Research Clusters

8 RGC Collaborative Research Funds from 2022 to 2024

INTERNATIONALISATION

~40%

Academic staff are from overseas

~45%

Non-local students in the Faculty

#6 THE WORLD UNIVERSITY RANKINGS

THE The Most International University in the World in 2024



TEACHING & LEARNING

7 Undergraduate Programmes
· 4 Programmes by the Faculty
· 3 Joint Programmes

9 Taught Postgraduate Programmes

Research Postgraduate Programmes
· Master of Philosophy
· Doctor of Philosophy

GRADUATE EMPLOYMENT

Essentially 100% employment rate in the past decade (including further studies)

ADMISSIONS INTAKE FOR UNDERGRADUATE PROGRAMMES

Highest scores for 2023/24 intake:

	JUPAS [#]	Non-JUPAS
6901 Bachelor of Science	39.5	44 (IB)/ 5A*(GCEAL)
6688 Bachelor of Science & Master of Research (Science Master Class)	42.5	44 (IB)/ 5A*(GCEAL)
6858 Bachelor of Science and Bachelor of Laws	42.5	4A*(GCEAL)
6729 Bachelor of Science in Actuarial Science	39.5	40 (IB)/ 4A*1A(GCEAL)
6224 Bachelor of Arts and Sciences (AppliedAI)	41	4A*(GCEAL)

* Best five subjects score

KNOWLEDGE EXCHANGE

Patent Application Granted: 92 over the past three years

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MESSAGE FROM THE CHIEF EDITOR



It is with great excitement that I unveil to you the very first edition of *Science Sparks*, an annual publication that serves as a testament to our dedication and innovative spirit within the Faculty of Science at HKU. This publication emerges as a revamped successor to our traditional newsletter, complementing our regular bi-monthly e-news and offering a comprehensive view into the ever-evolving landscape of our Faculty's latest endeavours.

Science Sparks embodies the vibrant and dynamic nature of scientific discovery. Breakthroughs can be inspired by our daily lives, while the knowledge gained can also influence our future way of life. At the core of *Science Sparks* lies the fuel that propels researchers into the realm of the unknown. Our Spotlights section illuminates the remarkable journeys of our research initiatives, tracing their paths from creative lab concepts to tangible real-world impacts. These stories underscore our commitment to transcending disciplinary limits, tackling diseases, and trailblazing toward a sustainable future.

In our quest to celebrate and encourage the next wave of scientific talents, we shine a light on the promising young professionals who are pushing the boundaries of science — be they entrepreneurs with a scientific twist or dedicated researchers making strides in their respective fields. Their stories are not just narratives of personal achievement; they are beacons meant to inspire and motivate the upcoming generation to chase their scientific aspirations and create meaningful changes.

In addition to showcasing a selection of highlighted projects in our Research Stories, we engage in insightful dialogues with our distinguished scholars in Expert Exchanges and aspiring scientists in the Fresh Perspectives column. Their thoughts and viewpoints offer intriguing insights into the cosmos's billions-year-old history, pushing our understanding of the universe to new heights. Our Faculty's commitment to excellence is unwavering, and it is my pleasure to invite you on an exploratory journey through this edition to witness the remarkable achievements and substantial external funding our academics have garnered.

Dive into the pages of *Science Sparks* and join us on a journey of curiosity and inspiration. We eagerly anticipate engaging with you as we continue to explore the frontiers of science.

Yours sincerely,
Professor Edmund Chun Ming TSE
Chief Editor
Assistant Professor, Department of Chemistry

SPOTLIGHTS

From Lab to Launch:

Elevating Ideas into Action for a Better World

We are fully engaged to translate fundamental scientific discoveries into applications by developing a platform for innovative peptide-based drugs.

Synthesise Antibiotics to Fight Against Superbugs

Principal Investigator // **Professor Xuechen LI**, Professor of the Department of Chemistry and Inventor at Versitech Limited

In the ongoing battle against bacterial infections, Professor Xuechen Li and his team are revolutionising antibacterial medicine. They have achieved a breakthrough in rapidly synthesising cyclic peptide-based antibiotics, creating over a hundred new types. These antibiotics have proven effective in combating various illnesses, including pneumonia, skin infections, urinary tract infections, and other common bacterial infections. Acting as frontline soldiers, Professor Li's team fearlessly combat harmful bacteria, instilling hope in the fight against antibiotic-resistant strains.

Antibiotic resistance severely threatens public health as bacteria continuously evolve resistance to drugs. The overuse and abuse of antibiotics accelerate this process, leading to the emergence of 'superbugs' that resist antibiotic treatment. Without intervention, annual deaths from resistant infections could reach 10 million by 2050. Despite the urgency, big pharmaceutical companies hesitate to invest in developing new antibiotics, diminishing the market potential and exacerbating the scarcity of effective treatments.

'Due to limited profit margins of antibiotics as compared to the drugs for chronic diseases, pharmaceutical companies have shown less interest in developing new antibiotics. This is mainly because the treatment duration is short, and antibiotic-resistant strains emerge rapidly,' highlighted Professor Li. 'However, this emphasises the crucial role that researchers must play in

exploring new antibacterial compounds and finding innovative solutions to address the urgent need.'

To tackle this issue head-on, Professor Li's team has been wholeheartedly committed to studying bacterial resistance and developing antibacterial agents since 2009. They have exhibited exceptional innovation, competitiveness, and expertise in synthesising and studying the medicinal chemistry of cyclic peptide-based antibiotics — a promising yet often overlooked class.

Pioneering Research in Cyclic Peptide-Based Antibiotics

Cyclic peptide-based antibiotics have long been used for the treatment of various bacterial infections and have a proven track record of effectiveness in combating these pathogens.

Step into the realm of scientific innovation and societal impact with *Science Sparks*, where we explore the dynamic trajectories of three innovative projects backed by HKU. From laboratory experimentation to real-world application, discover how these initiatives transcend academic boundaries to tackle antibiotic resistance, combat COVID-19, and pioneer sustainable solutions. Join us as we shed light on the transition from laboratory exploration to impactful deployment, shaping a brighter future for humanity.

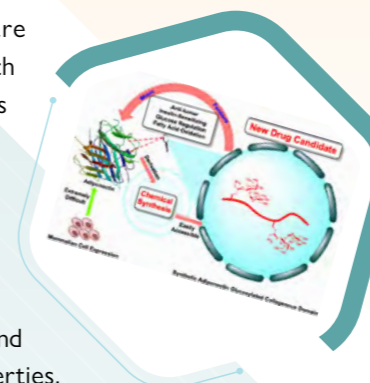
Traditionally, these antibiotics are obtained through fermentation, which is limited by the biological system's constraints.

To overcome the slow production rate associated with natural fermentation, chemical synthesis provides a viable alternative, allowing for flexible structural modification and enhancement of therapeutic properties. However, synthesising cyclic peptide-based antibiotics is a complex process that requires innovative strategies and specialised techniques.

In this regard, Professor Li's team has made significant strides through their pioneering work in Serine/Threonine ligation (STL), which provides a powerful tool for peptide and cyclic peptide chemical synthesis, leading to remarkable achievements in antibiotic development. Their breakthroughs include the total synthesis of daptomycin, a challenging task unresolved for 30 years. In 2013, the team utilised an in-house STL technology (*J. Am. Chem. Soc.* 2013) to achieve the first total synthesis of daptomycin, a type of cyclic peptide-based antibiotic.

Furthermore, leveraging their in-house STL technology, they have made significant advancement in achieving the total syntheses of teixobactin (*Nature. Commun.* 2016), malacidin (*Angew. Chem. Int. Ed.* 2020) and mannopeptimycin (*J. Am. Chem. Soc.* 2021). Building on this success, the team swiftly and efficiently synthesised more than 100 structural analogs, leading to the discovery of a new generation of antibiotics, kynomycin, with extremely high antibacterial activity against both daptomycin-sensitive and resistant strains and low toxicity to mammals.

To further facilitate the development of kynomycin, the patent has been licensed to a mainland-based pharmaceutical company by HKU's Technology Transfer Office through its wholly-owned subsidiary, Versitech Limited. Currently, kynomycin is undergoing phase I human clinical trials, marking a significant milestone in its development.



Offering Hope in Combating Resistant Pathogens

The team has also synthesised other complex cyclic peptide antibiotics that show promise in fighting drug-resistant bacteria. In 2016, the team successfully synthesised teixobactin, laying the foundation for the creation of over 100 analogues. This breakthrough has deepened their understanding of these compounds and their potential clinical uses. In 2020, they reached a significant milestone by determining the absolute structure of Malacidin A, a potent antibiotic-targeting drug-resistant superbugs such as Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Vancomycin-Resistant *Enterococcus* (VRE). In the face of escalating antibiotic resistance, Professor Xuechen Li's team offers hope for combating resistant pathogens through innovative approaches in antibacterial development.

'With the technology and expertise we have acquired, our goal is to create a platform that enables the development of innovative cyclic peptide-based antibiotics. Through this platform, we aspire to bridge the gap between scientific discoveries and practical applications to address the pressing need for new antibiotics,' Professor Li said.



◀ Website of X C Li Laboratory

Our goal is to create a future where one treatment can effectively combat multiple viral threats, bringing us closer to a healthier, more resilient world.



Simple, Safe, and Affordable COVID-19 Treatment on the Horizon

Principal Investigator // **Professor Hongzhe SUN**, Founder of Bi-well Pharma
Norman & Cecilia Yip Professor in Bioinorganic Chemistry and Chair Professor of the Department of Chemistry

In their relentless pursuit of effective COVID-19 treatments, Bi-well Pharma, led by Professor Hongzhe Sun, is emerging as a trailblazer. By repurposing FDA-approved drugs, this innovative startup has developed a cocktail therapy that not only outshines existing treatments but also redefines simplicity, safety, and affordability.

‘Our mission is to develop an affordable cocktail therapy not only for current pandemic but also to be prepared for future ones,’ affirmed Professor Sun. His unwavering commitment to addressing global health challenges also earned him the HKU Innovator Award.

Bi-well Pharma’s journey began with the screening of various metallodrugs, leading to the identification of potent bismuth(Bi(III))-based compounds effective against the SARS virus in 2003. Before Professor Sun’s team made their discovery, who could have known that the pink bismuth liquid for stomach pain relief – the same over-the-counter bismuth-based drug likely sitting in your home right now – could be the solution to the ongoing coronavirus pandemic.

However, these drugs were poorly absorbed by the body because they faced limitations in the stomach environment. Undeterred, the research team made a significant discovery. They found that by combining Bi(III)-based drugs with *N-acetyl* cysteine, they could stabilise the Bi(III) ion in the stomach, allowing the drug to effectively reach other organs, opening new avenues for delivering the drugs to the lungs.

A Paradigm Shift in Safety and Effectiveness

‘What sets this therapy apart is its seamless integration of safety and effectiveness. The drugs utilised have a well-established safety record, having been in use for decades with minimal side effects,’ Professor Sun emphasised.

Crucially, the treatment targets multiple essential proteins in the virus at the same time, overcoming the potential of drug resistance. It has consistently demonstrated effectiveness against various virus variants, including the challenging Omicron BA5 variant.

‘The therapy outperformed other oral drugs on the market for COVID-19 in head-to-head comparisons,’ explained Professor Sun. ‘It resulted in a shorter hospital stay and a quicker reduction in viral load with comparable side effects and patient recovery time. Additionally, its easy accessibility and



well-understood safety profile allow it to accommodate more patients, addressing the shortages of oral drugs that might occur during peak infection periods.’

In their persistent pursuit of innovation to make a meaningful impact on scientific progress and improve lives, they have developed a stabilised cocktail therapy with significant benefits. It enables easy oral administration, enhancing patient convenience, while also addressing a key drawback of traditional antiviral drugs. Professor Sun explained, ‘Traditional antivirals require injection by a professional to reach the lung, leading to potential side effects like kidney damage. In contrast, our stabilised cocktail therapy offers patients a less painful treatment option with fewer side effects.’ Encouraging outcomes from initial clinical trials have laid a robust foundation, and presently, Phase III trials are actively progressing in Hong Kong and Shenzhen to substantiate its efficacy further.

Future Horizons: Broad-Spectrum Antiviral Drug

‘Beyond its impact on COVID-19, we are actively exploring the therapy’s potential as a broad-spectrum antiviral drug,’ revealed Professor Sun. He further emphasised that compared to antibiotics used for bacterial infection, broad-spectrum anti-viral drugs are limited in number and most of them often exhibit toxicity to human cells. In collaboration with HKU Li Ka Shing Faculty of Medicine, the team aims to develop Bi(III) compounds not only for SARS-CoV-2 but also for other human coronavirus infections such as SARS, MERS, and coronavirus 229E. This visionary approach could revolutionise antiviral medicine, offering a singular treatment option for a



range of viral infections while minimising harm to human cells.

‘Bi(III) was only used as a local drug to treat gastroduodenal disorders before. After our inventions, we open up new ways for Bi(III) to act as a drug to fight COVID-19, and also potentially as antibiotics resistance breakers– which is another topic we are now interested in.’

The interdisciplinary team, comprising chemists, microbiologists, pharmacologists, and clinicians, passionately engages in cutting-edge research driven by the potential to elevate human health.

Yet, their commitment extends beyond the laboratory. ‘We understand the profound impact on patients battling to preserve their well-being, emphasising not only science but also the enhancement of their quality of life. With an unwavering focus on accessibility, we aspire to translate this transformative science into tangible daily solutions that contribute to a healthier and more fulfilling existence for all,’ Professor Sun concluded.



◀ Website of Sun's Lab@HKU

We are promoting “Oyster Aquaculture Alliance for One Health” to introduce innovative technologies for modernising oyster aquaculture and foster collaboration among researchers and stakeholders.



Revolutionising and Advancing Oyster Aquaculture Towards a Sustainable Tomorrow

Principal Investigator // **Professor Thiyagarajan VENGATESEN**, Professor of the School of Biological Sciences and the Swire Institute of Marine Science, and the Director of Hong Kong Oyster Hatchery and Innovation Research Unit (HKO-HIRU)

In the face of significant threats from altered coastal habitats by human and climate change, oyster cultivation in Hong Kong and south China encounters hurdles. Elevated temperatures, ocean acidification and altered seasonality, i.e. warmer winters with less rain, compromise the immune systems and activate the reproductive system in the wrong time in these delicate creatures, rendering them susceptible to infections and causing substantial losses for growers. Their limited tolerance for heat and salt in challenging environments also poses a significant obstacle to achieving sustainable farming.

‘That’s why we’re trying to breed high-stress tolerant oysters to mitigate these issues and help growers in the area to expand their culture in saltier areas of estuarine and coastal habitats,’ said Professor Vengatesen.



The HKU Oyster Hatchery, under Professor Vengatesen’s leadership and funded by the HKSAR government via the Sustainable Fisheries Development Fund (SFDF), plays a pivotal role in producing oyster seeds with specific traits, such as high salinity and stress resistance. A diverse team of experts from aquaculture, molecular biology, and genomics, studies adaptive and tolerance mechanisms to identify stress tolerant-genes, peptides and proteins in various oyster populations and species.

Through SNP (Single Nucleotide Polymorphism) marker – assisted selective breeding approach in close collaboration with local growers who are engaged in traditional selection

process over centuries, the hatchery endeavours to craft oyster strains tailored to the local environment, focusing on climate change impacts to enhance resilience. Notably, it has successfully delivered over 5,000 strings of seeds obtained from those stress-resilient broods to the local oyster growers in Lau Fau Shan area of Hong Kong. This season marks a significant milestone as the hatchery announces the successful production of its inaugural batch of triploid oyster seeds of those stress-resilient populations, with ongoing monitoring to assess their performance.

‘Hatchery seeds are expected to have a very high success rate compared to wild seeds, as they have been fed with high-quality food,’ Professor Vengatesen remarked. ‘Using our innovative high-density recirculating hatchery facility, we can easily produce 24 million seeds using just six tanks of 500 L capacity in the breeding season,’ he added.



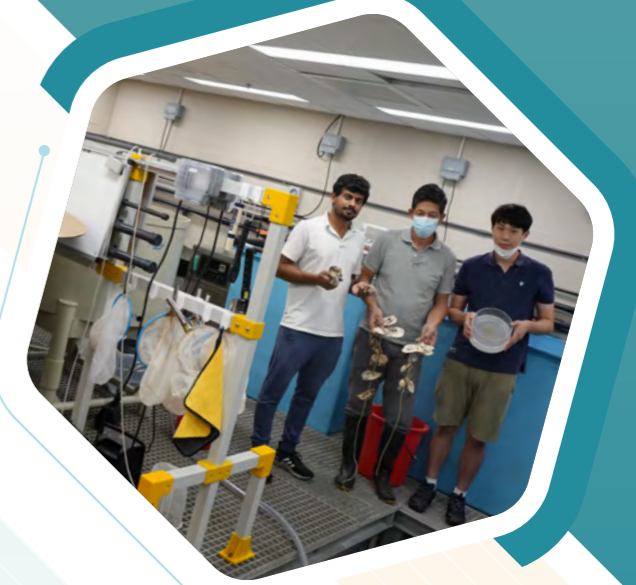
Collaborative Research and Breeding Efforts

The multidisciplinary team collaborates extensively to develop new oyster strains suited to changing environmental conditions. They work tirelessly towards breeding oysters that can withstand challenging factors such as climate change and diseases. In doing so, their efforts contribute to sustainable and resilient oyster aquaculture practices. ‘We are committed to ongoing research and breeding efforts, aiming to develop oyster strains with even higher stress tolerance,’ Professor Vengatesen emphasised.

As the hatchery expands genetic diversity and enhances stress tolerance in oyster strains, it also actively explores sustainable production techniques. This includes optimising resource utilisation, reducing waste, and minimising the environmental impact of oyster aquaculture. ‘Our multidisciplinary approach allows us to address the complex challenges oysters face in their environment,’ Professor Vengatesen explained.

Strengthening Industry Ties, Knowledge Sharing and Public Education

The project has developed impactful technologies in collaboration with growers in South China and Lee Kum Kee Co. Ltd. By nurturing collaborations with local oyster farmers, scientists, and industry stakeholders, the hatchery aims to facilitate knowledge sharing, exchange best practices, and work collectively towards sustainable growth and development of the oyster industry not only in Hong Kong but also in south China. ‘Collaboration and knowledge sharing are essential for the continued success of the oyster aquaculture industry,’ Professor Vengatesen affirmed, underscoring the importance of the collaboration.



The hatchery plays a vital role in public education about the ecological significance of oysters, promoting sustainable aquaculture practices, and raising awareness about the cultural importance of oysters in the region. Through various initiatives and programmes, the hatchery aims to foster a greater understanding of the value of oyster aquaculture among the public. ‘We aim to educate the public about the ecological and cultural significance of oyster aquaculture in Hong Kong,’ Professor Vengatesen supplemented.



Looking Towards the Future

As we envision the future of oyster aquaculture in Hong Kong, it is evident that the dedication and innovative approach of researchers like Professor Vengatesen and the HKU Oyster Hatchery has become paramount. Fostering collaboration, knowledge sharing, and a commitment to sustainability ensures the sector’s thriving continuation, preserving cultural heritage and ecological significance for generations to come.



◀ Website of HKO-HIRU

CHEMICAL SCIENCE

► BIOMEDICAL CHEMISTRY ◀

CRAFTING A NANO SPINE FOR INTRICATE DELIVERIES INSIDE THE BODY

Lead Researcher // **Professor Yufeng WANG**, Associate Professor of the Department of Chemistry
Collaborator // The Chinese University of Hong Kong

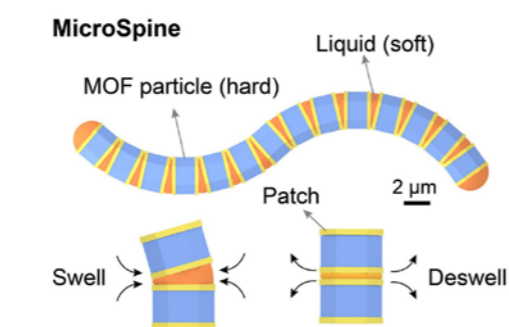
Inspired by the human spine's strength and flexibility, our researchers developed 'MicroSpine', a remarkable microscale innovation using colloidal assembly. Unlike traditional methods, this technique offers precise control and higher yield in creating microscale structures.

The team crafted particles from metal-organic frameworks (MOFs), a porous material known for its high directionality and customisable properties. These particles serve as the rigid component, merging with soft liquid droplets to form linear chains — the hard and soft components alternate positions in the chain, mimicking the spine's structure.

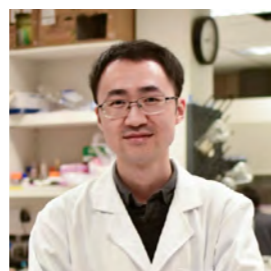
Its unique adaptability allows it to encapsulate tiny cargo, much like a miniature vehicle delivering medicine precisely where it is needed in our bodies. Moreover, its precise construction paves the way for creating super-sensitive sensors or smart microrobots capable of intricate tasks.



◀ Learn more



Structure of MicroSpine and spine. Image adapted from the journal paper.



Professor Yufeng WANG

我們的研究團隊開發了一種名為 MicroSpine 的微米級仿脊椎結構，其靈活變形的特性可用作開發微型驅動器等。這項技術通過膠體組裝實現，能夠執行微米級的複雜任務，如標靶藥物傳遞和局部感測等。

Journal paper: Biomimetic thermoresponsive superstructures by colloidal soft-and-hard co-assembly (published in Science Advances, 2023)

Colloid research is unveiling new frontiers in science, including nanotechnology, environmental remediation, healthcare advancements, and materials engineering. Recent research developments at our Faculty underscore the transformative impact of this field. These advances highlight the versatility and growing significance of colloid science in shaping our modern world.

THE SCIENCE BEHIND:
WHAT ARE COLLOIDS?

- Colloids consist of tiny particles dispersed in another substance, forming a stable suspension, like fat in milk or water droplets in fog.
- They range in size between molecular and visible, typically from 1 nm to 1 μm.
- The surrounding medium stabilises the particles, such as water in milk or a liquid in gelatin, stabilises these particles.
- Widely employed across industries, colloids stabilise food, facilitate drug delivery, and enhance materials.

► PHYSICAL CHEMISTRY ◀

INNOVATING SMART INK PAINTING THROUGH THE POWER OF LIGHT

Lead Researcher // **Professor Jinyao TANG**, Associate Professor of the Department of Chemistry
Collaborators // The Hong Kong University of Science and Technology and the University of Electronic Science and Technology of China

Cephalopods, like squids and octopuses, can change their skin colour to match their environment, acting as natural camouflage. This colour transformation occurs as tiny pigment particles in their skin move with muscle flexing. Inspired by this natural phenomenon, our team crafted a photochromic Active Colloids ink that mimics cephalopod colour-changing abilities.

Rather than creating new colours, they used light to reposition existing pigments within the ink. By combining various coloured microscopic beads, they created a light-responsive colour display — essentially, painting with light.

This advancement heralds new possibilities for dynamic colour displays and adaptive materials. Beyond just changing colours, it holds promise for creating light-sensitive micro-robots that can be controlled by adjusting the type and intensity of light. These robots can either gather or scatter as required, allowing them to adapt to different environments and tasks.



◀ Learn more

Journal paper: Photochromism from wavelength-selective colloidal phase segregation (published in Nature, 2023)

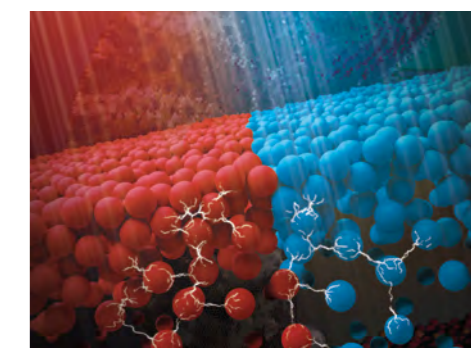
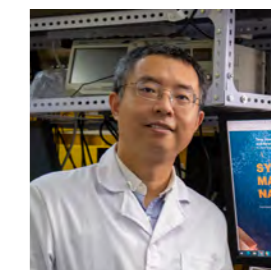


Image adapted from the journal paper.



Professor Jinyao TANG

我們的研究團隊開發了一種新型的活性膠體材料，可通過混合青色、洋紅色和黃色膠體，形成動態的納米纖，並通過控制光線的入射波長和強度來控制膠體的運動和相互作用，從而產生不同的顏色。這種新的技術比傳統的變色材料更加可靠和便利。

MOLECULAR AND
CELL BIOLOGY

In the intricate tapestry of molecular and cell biology, understanding both the evolutionary journey of our cells and the delicate mechanisms that ensure their integrity is paramount. Each cell's evolution and mechanisms offer insights into our biological essence, driving innovations in medicine and our grasp of life.

► BIOLOGICAL SCIENCES ◀

DECODING AGE STAMPS
IN UNDERSTANDING
DEVELOPMENTAL
EVOLUTION

Professor Chaogu ZHENG

通過分析秀丽隱桿線蟲個別細胞的基因表達，研究人員確定了不同類型細胞的進化年齡，揭示了物種演化的遺傳機制。這有助於我們了解單細胞的轉錄組年齡和可能的進化起源，對醫學和生態學等領域具有重要影響。

Lead Researchers // **Professor Chaogu ZHENG**, Assistant Professor of the School of Biological Sciences and his Postdoctoral Fellow **Dr Fuqiang MA**

Imagine our bodies as historical landmarks requiring periodic restoration. As we would examine a building's foundation before restoring it, understanding each cell's 'evolutionary age stamp' deepens our understanding of biology and disease origins. While prior research highlighted embryos in the middle stage of embryogenesis express the oldest genes, details at the cellular level were lacking.

A trailblazing study conducted by our researchers provided clarity. Using advanced single-cell RNA sequencing, the team determined that cells forming foundational tissues like the reproductive germline and digestive endoderm rely on older genes, indicating that these cells preserved ancestral functions that carry out essential tasks during evolution. In contrast, certain neurons and skin cells, ever-adaptive to their environments, utilise younger genes that generate novel functions to facilitate adaptation. These findings show that evolution has a careful way of matching genes to specific cellular functions.

This deep dive into cell ages can unlock life's evolutionary story, leading to advancements in treating developmental disorders, refining regenerative medicine, and tailoring treatments based on individual genetic histories.

Learn more ►



Journal paper: Transcriptome age of individual cell types in *Caenorhabditis elegans* (published in PNAS, 2023)

► BIOLOGICAL SCIENCES ◀

CUTTING THE THREADS:
THE CELLULAR SCISSOR
ENSURING DNA INTEGRITY

Lead Researchers // **Professor Ying Wai CHAN**, Assistant Professor of the School and Biological Sciences and his Postdoctoral Fellow **Dr Huadong JIANG**
Collaborator // The Francis Crick Institute

Imagine untangling two intertwined yarn balls, and the threads represent chromosomes. The balls are connected by a delicate strand, and if you pull too hard, the strand might snap. Similarly, during cell division, thread-like structures called chromatin bridges can form between dividing cells. Mishandling these bridges can lead to damage, just like pulling too hard on the yarn balls might break them.

Our researchers have identified a unique enzyme within our cells called ANKLE1. This enzyme acts as 'scissors', cutting these unwanted threads to ensure cells divide cleanly without damage. Our findings suggest that without ANKLE1, these bridges could lead to significant issues, including DNA damage and potentially confusing our body's defence system, promoting it to attack our own cells.

Grasping the role of this enzyme is pivotal. It may lead us to strategies to maintain cell health and combat diseases like cancer, characterised by uncontrolled cell growth. Understanding ANKLE1 guides scientists in ensuring optimal cell function.

◀ Learn more



Journal paper: Human Endonuclease ANKLE1 localizes at the midbody and processes chromatin bridges to prevent DNA damage and cGAS-STING activation (published in Advanced Science, 2023)

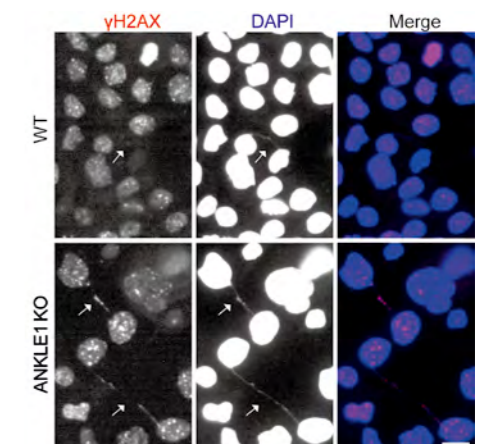


Image adapted from the journal paper.



Professor
Ying Wai CHAN

研究團隊發現了剔除 ANKLE1 將導致 DNA 纖維橋災難性斷裂，引發大量 DNA 損傷，破壞基因組穩定性和激活先天免疫反應。

ENVIRONMENTAL SCIENCE

Our dedicated scientists in the fields of environmental science are committed to safeguarding our environment and harnessing scientific advancements responsibly. Through focused research and innovative techniques, they address urgent real-world challenges, with a strong emphasis on environmental preservation. Their work aims to enhance our understanding of the complex systems that shape our planet, contributing to a sustainable future.



Image credit: Erick Cordes, Schmidt Ocean Institute

Ocean-based climate interventions (OBCIs) aim to address climate change by utilising the ocean's vastness. However, their potential impacts on deep-sea ecosystems are raising concerns. Our Marine Scientist, alongside an international team, evaluated these strategies.

One of the interventions involves injecting excess CO₂ into the deep ocean to store carbon, a process that could harm marine life due to hypercapnia — a condition caused by elevated CO₂ levels. Furthermore, techniques like ocean fertilisation, which promotes phytoplankton growth, and depositing crop waste in the deep sea may disrupt the food and oxygen availability for deep-sea life.

Given these risks, the team underscores the need for extensive research before implementing large-scale marine interventions. It is crucial to comprehend the deep sea's potential future impacts and ensure we take all necessary steps to protect its delicate ecosystems.



◀ Learn more

▶ MARINE SCIENCE ◀

ASSESSING RISKS OF CLIMATE SOLUTIONS IN THE DEEP SEA

Researcher // **Professor Moriaki YASUHARA**, Associate Professor of the School of Biological Sciences and the Swire Institute of Marine Science
Collaborators // The research is collaborated internationally and led by the University of California, San Diego



Professor Moriaki YASUHARA

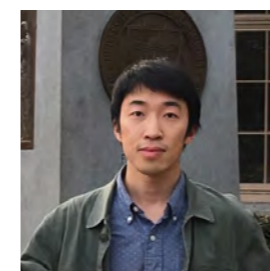
「基於海洋的氣候介入技術」(OBCIs) 是一種旨在利用海洋作為工具，減輕氣候變化影響的技術和策略。然而，這些干預措施對深海生態系統和生物多樣性卻有着潛在的影響。此研究對這些干預措施作出分析，評估其對深海生態系統和生物多樣性的影響。

Journal paper: Deep-sea impacts of climate interventions (published in Science, 2023)

▶ EARTH SCIENCES ◀

INNOVATIVE ROCK IMAGING REVEALS HIDDEN FLUID SECRETS AND THEIR LINK TO TINY EARTH SHAKES

Lead Researcher // **Professor Xin LIU**, Assistant Professor of the Department of Earth Sciences
Collaborators: Stanford University, Key Laboratory of Intraplate Volcanoes and Earthquakes (China University of Geosciences, Beijing), Ministry of Education



Professor Xin LIU

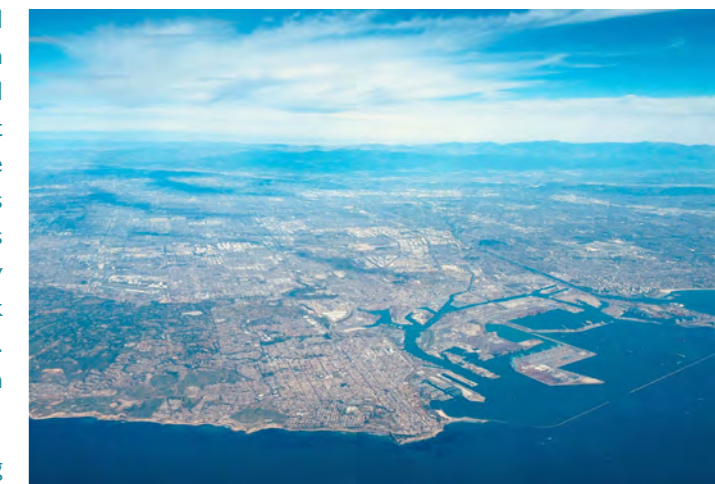
An international team, spearheaded by our geologist, has pioneered an advanced geophysical technique termed 'ambient noise differential adjoint tomography'. Using seismometers, the researchers delved into the Earth's subsurface. Deploying 42 instruments across the Los Angeles Basin, they discovered significant fluid-filled rock formations near earthquake fault lines.

These fluids act as natural lubricants, decreasing friction between rock blocks and possibly influencing minor seismic events.

Their discoveries enable clearer visualisation of fluid-containing rocks, paving the way for breakthroughs in identifying water and oil reservoirs. This research also holds promise for enhancing urban geologic hazard assessments, advancing early warning systems for tsunamis, and deepening our comprehension of the water cycle.



◀ Learn more



研究團隊研發了一種嶄新的方法，可有效視覺化地下含有流體的岩石，有助於水和油等地下流體資源的開發，可應用於建構城市地質災害和海嘯早期預警系統，以及增進人們對水循環過程的了解。

Journal paper: Ambient noise differential adjoint tomography reveals fluid-bearing rocks near active faults in Los Angeles (published in Nature Communications, 2023)

PHYSICS

Physics unites Earth and space, weaving together the principles of physics to unravel the mysteries of matter, energy, and forces. From understanding our world to exploring the cosmos, it guides us through supernovae and magnetic fields, connecting the smallest particles to the grandest cosmic events.

▶ ASTROPHYSICS ◀

ILLUMINATING THE PAST BY UNTANGLING THEORIES SURROUNDING A HISTORIC SUPERNOVA REMNANT

Researchers // **Professor Stephen NG**, Associate Professor of the Department of Physics and the Laboratory for Space Research (LSR), HKU and **Dr Yi-Jung YANG** of LSR
 Collaborators // The research is collaborated internationally and led by NASA

Back in the year 1006, an extraordinary event took place in the night sky that amazed people worldwide. A brilliant supernova, now called SN 1006, erupted with such luminosity that it illuminated the daytime for weeks – this remains one of history's most renowned and dazzling supernovae.

After centuries have passed, the time has finally come to unveil the mystery. Our research team collaborated with NASA and utilised the IXPE telescope, a cutting-edge instrument specifically designed to study X-rays with polarised properties, to delve into the magnetic field structure within SN 1006.

Despite some disorganisation, the magnetic fields still exhibited a preferred orientation like a bunch of tangled strings, but they all point in the same general way. This alignment correlated with the motion of shock waves from the explosion.



Professor Stephen NG

This discovery sheds light on the role of magnetic fields in trapping and accelerating high-energy particles within the remnant. It also deepens our understanding of supernovae and magnetic fields, driving advancements in technology for space exploration, spacecraft design, astronaut protection, and our comprehension of Earth's magnetic field.

港大天體物理學家與 NASA 合作，運用 IXPE 望遠鏡解開超新星殘骸的理論。

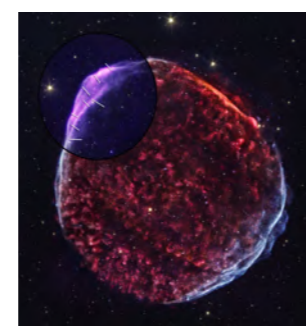


Image credits: NASA et al

WHAT IS A SUPERNOVA?

- A supernova occurs when a massive star reaches the end of its life and undergoes a catastrophic explosion, releasing an enormous amount of energy.
- This explosion causes the star to become incredibly luminous, briefly outshining an entire galaxy.
- Supernovae play a crucial role in dispersing heavy elements into space and shaping the evolution of the universe.

WHY IS SN 1006 SO SPECIAL?

- SN 1006 stands out due to its unique shape, with two expanding lobes that have bright edges.
- Scientists believe SN 1006 originated from the explosion of a white dwarf star, which had a companion star, creating a cosmic pair that orbited each other.
- White dwarfs are dense remnants of stars that have depleted their nuclear fuel and collapsed gravitationally.
- When the white dwarf accumulated enough mass from its companion, it experienced a massive supernova explosion, resulting in the formation of SN 1006.



Learn more ▶

Journal paper: Magnetic structures and turbulence in SN 1006 revealed with imaging X-ray polarimetry (published in the Astrophysical Journal, 2023)

▶ PHYSICS ◀

ELEVATING IMAGING QUALITY TO A NEW HEIGHT: HARNESSING SYNTHETIC COMPLEX FREQUENCY WAVES TO OVERCOME OPTICAL LOSS IN SUPERLENSES

Lead Researcher // **Professor Shuang ZHANG**, Chair Professor of the Department of Physics
 Collaborators // The University of California, Berkeley; Imperial College London; Chinese Academy of Sciences



Professor Shuang ZHANG

Imaging acts as a window that reveals hidden realms in biology, medicine, and materials science, allowing us to explore the mysteries of the microscopic world. However, despite impressive advancements in superlenses, there is a drawback: some of the valuable optical energy is converted to heat during imaging, which hampers performance. To tackle this challenge, our research

team has introduced a practical solution called the synthetic complex frequency wave (CFW) approach.

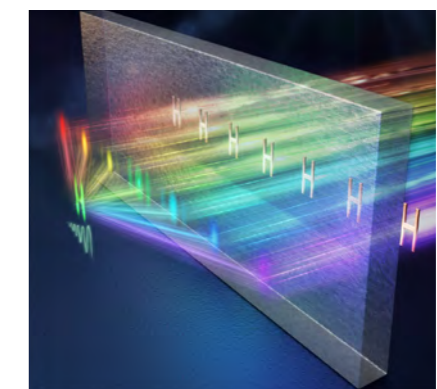
Imagine ordinary waves as gentle ripples on a calm lake, oscillating in a soothing pattern but lacking the ability to amplify themselves. In contrast, CFW possesses both oscillation and amplification components, capable of energising weakened optical signals. It is like a lake that can sustain its oscillating pattern for an extended duration. This CFW approach effectively addresses the image degradation caused by the conversion of optical energy into heat.

This research opens the door to a wealth of clearer images, similar to a sharper lens that enhances our quest for knowledge, unveiling the beauty found even in the tiniest details.

◀ Learn more



Journal paper: Overcoming losses in superlenses with synthetic waves of complex frequency (published in Science, 2023)



Schematic of imaging under real-frequency and synthesised complex frequency excitation in a superlens. Image adapted from the journal paper.

港大物理學家研發新一代光學技術，利用合成複頻波方法克服損耗，提升超透鏡成像品質。

WHAT ARE SUPERLENSES?

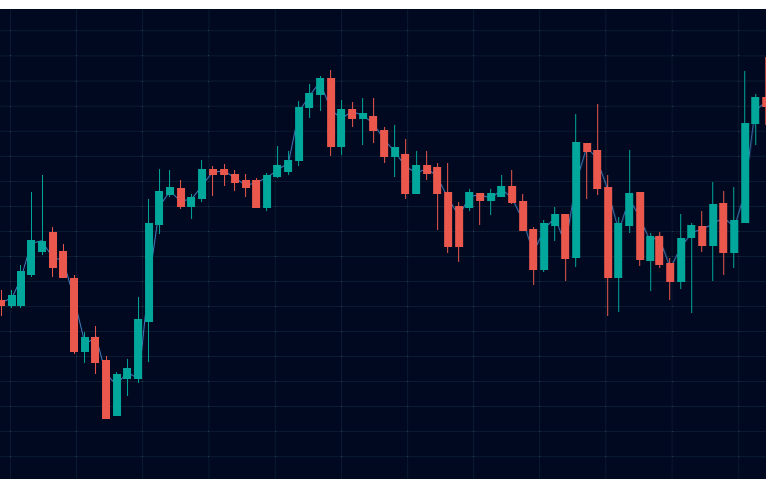
- Traditional optical microscopes have limitations due to the diffraction limit, which hampers their ability to resolve small features.
- Superlenses enable high-resolution imaging by utilising metamaterials with a negative refractive index, engineered at the nanoscale to manipulate light behaviour and overcome the diffraction limit.
- During the imaging process, a portion of the optical energy is converted into heat through the interaction between light and superlens materials.
- This optical loss diminishes signal strength and results in image quality degradation.

MATHEMATICAL SCIENCE

▶ ACTUARIAL SCIENCE ◀

OPTIMISING TRADING STRATEGIES BY DEEP LEARNING

Lead Researcher // **Professor Wenyuan LI**, Assistant Professor of the Department of Statistics & Actuarial Science
Collaborator // The University of Waterloo



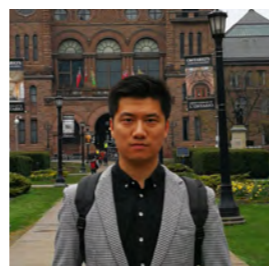
在金融市場中常常面臨各種交易限制。我們的研究人員採用了深度學習方法，通過考慮股票、債券和人壽保險等熱門金融產品，構建了一個多元化投資組合，然後利用神經網絡確定將資金投放在每個產品的理想配搭。



◀ Learn more

Individuals often face various trading constraints in the financial market, such as restrictions on short-selling, no borrowing from outside, minimum capital requirement, and risk measure. It is challenging to find mathematical solutions to optimal trading strategies under these constraints. Since his previous work at the University of Waterloo, our researcher has been employing a deep-learning approach to construct a diversified portfolio by considering popular financial products like stocks, bonds, and life insurance, and then use a neural network to determine the ideal allocation of funds for each product.

These strategies can help individuals outperform inflation, increase investment earnings, and manage mortality risk (death risk) under trading constraints. The result suggests that individuals tend to reduce their demand for life insurance when considering trading constraints. Moreover, the pioneering work can inspire more future research applying deep learning algorithms to portfolio management.



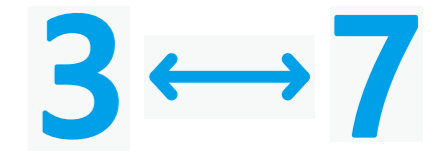
Professor Wenyuan LI

Journal paper: Individual insurance choice: A stochastic control approach (published in UWSpace, 2023)

Mathematical Science is incredibly important in our everyday lives, providing us with essential tools for problem-solving, critical thinking, and decision-making. It goes beyond practical applications and actually drives research and innovation in different fields. Even when certain mathematical theories may not seem directly related to our everyday experiences, they often lead to new discoveries and advancements, pushing us forward and expanding our knowledge in various areas.

▶ NUMBER THEORY ◀

BEYOND SUBTRACTION: EXPLORING THE NON-STANDARD METRIC AND P-ADIC INTEGERS IN MATHEMATICS



Lead Researcher // **Professor Kei Yuen CHAN**, Assistant Professor of the Department of Mathematics
Collaborator // The University of California, Berkeley; Imperial College London; Chinese Academy of Sciences

When comparing the distance between two numbers, such as 3 and 7, simply subtracting them ($7-3=4$) gives us a sense of how far apart they are. This method of subtraction is a common way to measure the distance between numbers.

However, there is another method called the non-standard metric that can be used to measure distances. This metric defines distance using the prime number factorisation of the numbers. By fixing a prime number p , a number x can be written in the form $p^k y$, where k is a non-negative integer and y is relative prime to p . For instance, if we fix $p=2$, we can calculate the distances between 3 and 7 and between 4 and 7. In this case, $7-3=2^2$ and $7-4=2^0 \times 3$. Comparing the exponents, we see that 2 is greater than 0.



Professor Kei Yuen CHAN

In the non-standard metric, distances are compared based on the number of prime factors present in the factorisation. Since $4(2^2)$ has more prime factors than

$3(2^0)$, the distance between 4 and 7 is considered longer than the distance between 3 and 7!

Initiated at Fudan University, our researcher studied this new metric known as p-adic integers. In contemporary mathematics, the Langlands programme is a significant framework that uses matrices to describe various number systems. Groups can be considered as collections of matrices, and the branching law uses an inductive structure to understand the entire group based on a subset of matrices. The precise link between matrices and numbers in branching laws is referred to as the Gan-Gross-Prasad conjecture. His recent discovery involves a new method of utilising the functorial properties of parabolic inductions in branching laws, which resolves a conjecture of Gan-Gross-Prasad for Arthur-type representations.

我們的數學研究人員發明了一種非標準的度量方法來計算距離，而其計算結果卻與我們通常使用的方法完全相反！

▶ Learn more



Journal paper: Restriction for general linear groups: The local non-tempered Gan-Gross-Prasad conjecture (non-Archimedean case) (published in Crelle's Journal, 2022)

'The record of life's origins has likely been forever lost on Earth, but exploring the ancient crust of Mars offers hope, and maybe the only chance to discover how life emerges.'

BRIDGING THE RED TO BLUE: EXPLORING LIFE'S ORIGINS IN THE FOOTSTEPS OF MARS

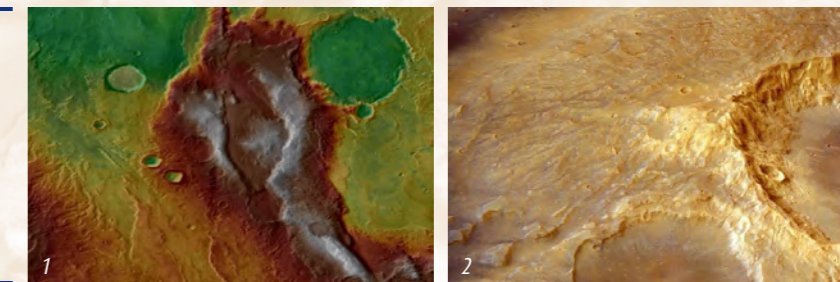
Why study Mars? This question perplexes many yet holds the key to unlocking countless mysteries of our universe. In an interview with Professor Joseph MICHALSKI of the Department of Earth Sciences and the first non-Chinese recipient of the prestigious Xplorer Prize, we explored the profound significance of studying Mars and the valuable insights it offers about our cosmos.

His research focuses on Mars' ancient crust and its potential to provide invaluable clues about the origins of life on Earth. By comparing the geological environments of Mars and Earth, Professor Michalski highlights the possibility of life having emerged on both planets.

Recently, his team revealed intriguing insights into the volcanic activity on Mars, lakes, and seas, as well as the possibility of ancient life on the Red Planet.

1. Topographic data are draped over infrared image data showing complex tectonic structures and volcanic deposits in the Eridania region of Mars. Warm colours are higher elevation. Image Credit: NASA/Mars Odyssey/HRSC.

2. Colour image data are draped onto topography to show a 3-D view of a large stratovolcano in the Eridania region of Mars. Image Credit: NASA/ESA/HRSC.



S: Science Sparks **J:** Professor Joseph Michalski

S: Why is it important to study volcanoes on Mars?

J: Scientists have long known that Mars has volcanoes, but the easiest ones to detect are the large shield volcanoes similar to those in Hawaii. My research has revealed some fascinating discoveries regarding diverse, smaller volcanoes on Mars, similar to the ones that form from plate tectonic recycling on Earth. We've identified lava domes, stratovolcanoes, calderas, and even ash shields. What's particularly intriguing is that these volcanoes exhibit a high silica content, indicating a complex process of magma evolution. This work shows that Mars experienced recycling of the crust, as occurs on Earth. But, the style is not plate tectonics. Crust recycling on Mars was done through a process called vertical tectonics, which is similar to the geology of Earth 3 or 4 billion years ago.

S: How does Mars' distant nature connect to its relevance in understanding life here on Earth?

J: We don't know how life formed on Earth, but we are pretty sure it emerged in hot springs or in lakes and seas rich with volcanic minerals and with high heat flow. The geologic evidence of how this happened has been lost due to high erosion rates on Earth, and plate tectonic processes on this planet. But the awesome fact is that Mars had all the hot spring, lake and sea environments as Earth did 3-4 billion years ago when life formed. My work has illustrated some of the key sites where life could have formed in these martian hydrothermal environments. Mars had many 1000s of hydrothermal sites, many 100s of lakes, and even some large seas. These sites are well preserved on Mars, like a geological museum awaiting our future exploration.

S: How does the study of Mars offer practical benefits for life here on Earth?

J: It is impossible to understand this planet well by studying only our Earth. By using 'comparative planetology', we reveal more fundamental truths about how climates evolve, how planetary crust forms and evolves, and how geology and biology influence each other. Further, planetary exploration requires technological innovation, which flows through the rest of the science disciplines, as well as the economy.

S: What influenced your decision to settle in Hong Kong?

J: The rapid advancements and expanding opportunities in space research and planetary exploration in Asia, specifically in Hong Kong, caught my attention. The dynamic culture, pleasant climate, and abundant outdoor activities like hiking added to the appeal. Hong Kong's considerable resources and support for my field, combined with its strategic location and potential to become a global centre for scientific pursuits, made it an enticing choice. The substantial investments in space initiatives in China and Hong Kong also played a role in shaping my decision, as they indicated a promising future for scientific endeavours in the area.

S: How do you see the future of space science in Hong Kong?

J: The future of space science at HKU and in Hong Kong in general is extremely bright. Aside from our pure science exploration initiatives, we are also integrating these discoveries and techniques into applied science through current and future robotic missions to the Moon and Mars. For example, one of the hydrothermal sites I discovered is currently the top-ranked science target for China's future Mars Sample Return mission (Tianwen-3). We hope to someday bring samples back from this location through Hong Kong-led science leadership. With all these opportunities in mind, we are proud to be educating a new generation of innovative space explorers in Hong Kong.

Professor Joseph MICHALSKI
Professor of the Department of Earth Sciences
Deputy Director of the Laboratory for Space Research



Website of Planetary Spectroscopy And Mineralogy Lab

Research Interests: The origin and volcano-tectonic evolution of planetary crusts; chemical weathering and planetary climates; origins and evolution of life (astrobiology).

Awards and Honours:

- 2023 Recipient of Xplorer Prize
- 2023 Hong Kong RGC Research Fellow
- 2022 Elected as a Fellow of the Geological Society of America
- 2019 Elected as a Fellow of the Canadian Institute for Advanced Research (CIFAR - Earth4D: Subsurface Science & Exploration)
- 2017 HKU Research Output Prize
- 2014 UK Space Agency Aurora Fellow
- 2014 First awardee of the Distinguished Alumni award from BGSU
- 2011 Marie Curie Fellows
- 2006 Postdoctoral Scholar at the NASA Jet Propulsion Laboratory
- 2005 PhD in Geological Sciences, Arizona State University

LEADING THE CHARGE: MEET OUR NEW CHAIR PROFESSORS

We proudly announce and celebrate the exceptional accomplishments of our esteemed Chair Professors appointed in 2023. Among them, five professors have been promoted from within our Faculty, while four newly appointed Chair Professors bring fresh perspectives and expertise from other institutions. Together, they all exemplify excellence in their respective fields.

By appointing more professors to the position of Chair Professor, we not only acknowledge their individual achievements but also reinforce the institution's dedication to maintaining and upholding high academic and professional standards. This expansion of Chair Professors further enriches the intellectual environment, fostering a culture of excellence, mentorship, and innovation within the Faculty. Join us as we explore their remarkable journeys and be inspired by their accomplishments.



Professor Guanhua CHEN

Chair of Theoretical Chemistry in the Department of Chemistry

Professor Chen (BSc, *Fudan*; PhD, *Caltech*) has been with Department of Chemistry since 1996, and was the Head of Department from 2010 to 2016, and is now the Managing Director of Hong Kong Quantum AI Lab, an AIR@InnoHK Centre.

Professor Chen's research focuses on (1) the application of machine learning in computational chemistry, and (2) the development of first-principles quantum mechanical method to simulate electronic, optoelectronic and electrochemical devices. Employing the integrated platform of machine learning, quantum simulation and experimental calibration, Professor Chen's lab is currently interested in solving the realistic challenges in renewable energy industry.

Professor Chen is an elected Fellow of American Physical Society (2014-), a Fellow of Royal Society of Chemistry (2011-), and received the Croucher Foundation Senior Research Fellowship in 2016.

Learn more: <https://hub.hku.hk/cris/rp/rp00671>

Professor Xiaodong CUI

Chair of Condensed Matter Physics in the Department of Physics

Professor Cui holds the position of Associate Head at the Department of Physics and has served as a Council Member for the Physics Society of Hong Kong since 2005. Before joining the Faculty of Science in 2004, Professor Cui was a joint postdoctoral research fellow at Columbia University and IBM.

His work centres around the investigation of the physical properties of 2D semiconductors, with a specific emphasis on exploring the optical properties of 2D transition metal dichalcogenides. Notably, he leads an internationally recognised team that conducts cutting-edge research in the field of Valleytronics, a groundbreaking research area leveraging the concept of 'valleys' to impart electrons with a novel degree of freedom under controlled conditions.

Cui is a 2017 recipient of the Croucher Foundation Senior Research Fellowship and he received the Outstanding Researcher Award in 2017 and the Research Output Prize in 2015 from HKU.

Learn more: <https://hub.hku.hk/cris/rp/rp00689>



Professor Hongjie DAI

Chair Professor of the Department of Chemistry

NEWLY APPOINTED

Professor Dai holds a joint appointment in the Department of Chemistry, the Department of Mechanical Engineering, and the School of Biomedical Sciences. Prior to joining HKU, Professor Dai had a tenure of over 15 years at Stanford University, where he is the J G Jackson and C J Wood Professor of Chemistry, Emeritus.

His highly interdisciplinary research spanning multiple disciplines including chemistry, physics, materials science, and medicine. He is a pioneering figure in the fields of carbon nanotube and nano-graphene based drug delivery and photothermal therapy, and he has contributed significantly to the development of in vivo near-infrared II/short-wave infrared biological imaging.

Dai has been named Highly Cited Researcher by Clarivate for 10 years from 2014 to 2023 in 3 different fields. In addition, he is a Foreign Member of the Chinese Academy of Sciences, the National Academy of Medicine, USA, the National Academy of Sciences, USA, and the American Academy of Arts and Sciences.

Learn more: <https://hub.hku.hk/cris/rp/rp03193>

Professor Zheng Xiao GUO

Chair of Chemistry and Materials Science in the Department of Chemistry

Professor Guo is a joint-faculty Professor of Chemistry and Mechanical Engineering. He is an Honorary Professor at University College London, where he was Professor of Chemistry and Pro-(Vice) Provost and China Ambassador before joining HKU.

Focused on the synthesis and simulations of highly functional atomic clusters, nanostructures, and materials, Guo's group combines fundamental design principles with *ab initio*, molecular dynamics, cellular automata, and finite element simulations and machine learning for materials discovery and device innovation. He has contributed around 300 high-quality journal publications and over 300 conference papers/presentations.

He was the first Chinese recipient of the Sir Beilby Medal & Prize in 2000, and is an elected Member of the Academia Europaea, a Fellow of the Institute of Materials, Minerals and Mining and a Fellow of the Royal Society of Chemistry, where he served as a Member of the RSC Publishing Board and Science Sub-Board from 2015 to 2018.

Learn more: <https://hub.hku.hk/cris/rp/rp02451>



Professor Xuhua HE

Chair of Mathematics in the Department of Mathematics

NEWLY APPOINTED

Before joining HKU in 2023, Professor He was Choh-Ming Li Professor of Mathematics at the Chinese University of Hong Kong and Professor at the University of Maryland.

He investigates arithmetic geometry, algebraic groups, and representation theory, with a focus on finite and affine Weyl groups, flag varieties, and their applications.

He is a New Cornerstone Investigator and a recipient of the Xplorer Prize, and the Chevalley Prize in Lie Theory from the American Mathematical Society in 2022 and the Morningside Gold Medal of Mathematics from the International Congress of Chinese Mathematicians in 2013. He was an invited speaker at the International Congress of Mathematicians in 2018.

Learn more: <https://hub.hku.hk/cris/rp/rp03134>

Professor Dong LI

Chair of Mathematics in the Department of Mathematics

NEWLY APPOINTED

Before joining HKU in 2023, Professor Li was affiliated with the University of British Columbia (UBC), the SUSTech International Center for Mathematics at the Southern University of Science and Technology, and the Hong Kong University of Science and Technology.

His research primarily centres around nonlinear partial differential equations, specifically the fundamental aspects and long-time asymptotic behaviour of solutions. His work also probes the application of mathematics in the sciences, such as fluid dynamics, biology, and physics.

Li was a von Neumann Fellow at the School of Mathematics of the Institute of Advanced Study from 2012 to 2013. He received the Charles A. McDowell Award at UBC for his outstanding achievements in pure or applied scientific research as a young faculty member, and was honoured with the Coxeter-James Prize by the Canadian Mathematical Society in 2015. Li has been a founding member of the Hong Kong Young Academy of Sciences since 2019.

Learn more: <https://hub.hku.hk/cris/rp/rp03112>





Professor Sir Fraser STODDART

Chair of Contemporary Chemistry in the Department of Chemistry

NEWLY APPOINTED

A distinguished chemist and Nobel Laureate, Professor Stoddart was a Board of Trustees Professor of Chemistry at Northwestern University for 16 years before joining HKU in 2023. He is also the Dean of the Stoddart Institute of Molecular Science at Zhejiang University and a Visiting Professor of Chemistry at both Northwestern University and the University of New South Wales.

Stoddart's groundbreaking research has transformed the understanding of chemical bonding by introducing the concept of the mechanical bond. He is currently working on the fabrication of molecular pumps and electric molecular motors, and his research spans the fields of chemistry, materials science, and molecular nanotechnology.

In addition to the 2016 Nobel Prize in Chemistry, he is a recipient of the Centenary Prize from the Royal Society of Chemistry and the 2007 King Faisal International Prize in Science. He has been named Highly Cited Researcher for 11 consecutive years, and is a Fellow of the National Academy of Sciences, USA, the Royal Society of London, UK, and a foreign member of the Chinese Academy of Sciences.

Learn more: <https://hub.hku.hk/cris/rp/rp03196>

Professor Alice Sze Tsai WONG

Chair of Cancer Biology in the School of Biological Sciences

Professor Wong is the Associate Vice-President of Research, Director (Interim) of the School of Biological Sciences, and Director (Interim) of the Dr Li Dak-Sum Research Centre, HKU-Karolinska Institutet Collaboration in Regenerative Medicine.

She is internationally recognised for her expertise in signal transduction in cancer. In particular, cell adhesion molecules in various physiological processes, and their contribution to cancer when dysregulated. She has made numerous seminal contributions to this research and its translational applications with innovation and technology awards. She is a Fellow of the Royal Society of Biology. She is also the recipient of numerous prestigious awards for research excellence, including the Women in Cancer Research – Brigid G Leventhal Scholar Award, the AACR-Bristol-Myer Squibb Oncology Young Investigator Scholar Award, the Croucher Senior Research Fellowship, and the RGC Senior Research Fellowship.

In addition to her remarkable research achievements, Professor Wong also has a significant contribution to teaching and learning, as recognised through the Senior Fellowship by the Higher Education Academy.

Learn more: <https://hub.hku.hk/cris/rp/rp00805>



Professor Wenan ZANG

Chair of Mathematics in the Department of Mathematics

Professor Zang is a leading expert in combinatorial optimisation, integer programming, algorithm design, and graph theory. He has successfully resolved several prominent long-standing open problems in these research fields, and has significantly advanced the theory of polyhedral combinatorics, which plays a central role in operations research and theoretical computer science. Moreover, he has discovered some powerful and novel combinatorial methods that can be used to tackle various important optimisation problems.

Professor Zang is a recipient of the Hao Wang Prize and the Overseas Outstanding Young Scholar Award. One of his papers was selected as an Outstanding Research Achievement by the Academy of Mathematics and Systems Science, Chinese Academy of Sciences, and another one was included in the very first volume of Discrete Mathematics – Editor's Choice. He is currently an editorial board member for both *Discrete Applied Mathematics* and *Journal of Combinatorial Optimization*. He also served as an associate editor for *Operations Research*, a flagship international journal in this subject.

Learn more: <https://hub.hku.hk/cris/rp/rp00839>



FUNDING

The Faculty has achieved remarkable success in securing external competitive research grants, totalling over HK\$330 million since the 2022/23 academic year to date. This substantial funding has provided crucial support for a wide range of cutting-edge research projects, enabling scholars to delve into various scientific domains and push the boundaries of knowledge. Additionally, these grants have served as recognition for outstanding research achievements of individuals within our Faculty. Below, we have highlighted some of the notable grants that have contributed to these accomplishments.



Research Grants Council General Research Fund (GRF) and Early Career Scheme (ECS) 2022/23 and 2023/24:

HK\$129M

The most significant individual research funding sources support a total of 134 projects in 2022 and 2023.

Research Grants Council Senior Research Fellow Scheme (SRFS) and Research Fellow Scheme (RFS) in 2022/23 and 2023/24:

HK\$31M

These prestigious schemes are designed for outstanding mid-career researchers at the Associate Professor rank and senior researchers at the full Professor rank, respectively. Five researchers were awarded grants under these schemes in 2022 and 2023.

Research Grants Council Strategic Topics Grant (STG) 2023/24:

HK\$10M

Collaborative Research Fund (CRF) 2022/23 and 2023/24:

HK\$31M

Theme-based Research Scheme (TRS) 2022/23:

HK\$43M

These three grants provide funding for large-scale collaborative research endeavours. In 2022 and 2023, a total of eight research projects led by our researchers were granted funding.

Tencent's New Mega Research Grant Scheme New Cornerstone Investigator Program 2022 and 2023:

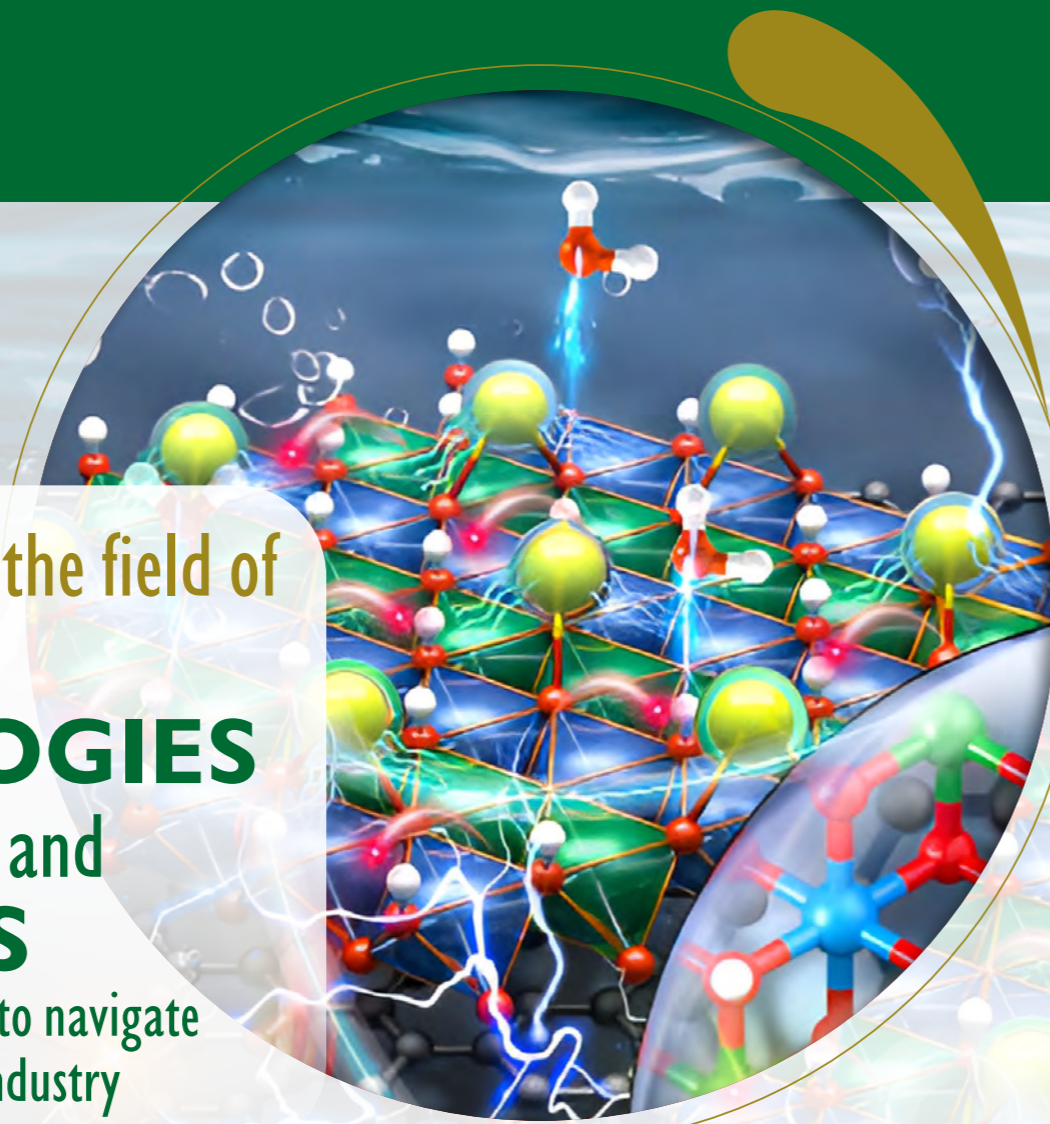
HK\$40M

Tencent established the Foundation in 2022 to provide long-term support for basic research spearheaded by leading scientists. We have two academics receiving funding through this programme during their employment at HKU.

NEW

Master of Science in the field of CHEMICAL TECHNOLOGIES for HEALTH and MATERIALS

Nurture future professionals to navigate
the ever-evolving chemical industry



Introducing the Master of Science in Chemical Technologies for Health and Materials – a cutting-edge programme that equips students with the skills needed to thrive in today's dynamic society and the ever-evolving industry underpinned by chemistry, such as drug design, molecular/viral sensing, medical diagnosis, environmental remediation, pollutant removal, clean energy conversion, energy storage, plastic upcycling and carbon dioxide capture and utilisation. As the world undergoes unprecedented changes, there is growing emphasis on developing innovative technologies to tackle complex real-world problems. This programme prepares future-facing professionals who can drive innovations and technological advancements in chemistry and various domains.



Host
Department of Chemistry



Programme Features

- 1.5 years full-time, to deepen knowledge and key skill sets
- Applications of chemical technologies in health and materials are highlighted, with a particular focus on drug discovery and the development of novel materials
- The contents cover a wide range of subjects from drug design and synthesis, quality assurance, and modern analysis techniques, to energy harvesting, conversion and storage, and technology transfer
- Fostering an innovative mindset, with advanced transferable skills and ample opportunities for hands-on experience



◀ Programme Details

Q&A about the Programme

Q: How does the programme engage with the leading-edge domains in chemical advancements?

A: Health science and materials technologies are two interconnected domains at the forefront of chemical advancements. With chemistry as the enabling science, this programme offers solutions in areas such as understanding molecular processes, developing chemical probes for biomedical research, and innovating screening and diagnostic methods. It also addresses the global demand for advanced materials to address environmental challenges and improve living standards.

Q: What will I learn from this programme?

A: You will gain a comprehensive grasp of chemical technologies in health and materials, from drug synthesis to advanced materials. This encompasses expertise in chemical biology, chemical instrumentation, and data analysis. You will have a chance to design materials for energy, delve into tech startups' chemical aspects, and apply bioanalytical methods for drug discovery, diagnosis, and treatment. The programme emphasises sustainable and green chemistry practices and equips you with skills to interpret and use big data in analytical chemistry.

Q: Are there opportunities for interdisciplinary learning?

A: Absolutely. The programme emphasises interdisciplinary learning, intertwining core chemical principles with modern technology applications, healthcare solutions, startup dynamics, and data-driven insights. This holistic approach ensures students comprehensively understand chemistry's multifaceted role in today's evolving industries.

Q: How does the programme equip students for the future workforce?

A: Involving industrial partners and public sector experts as instructors to provide real-world perspectives, our programme endeavours to equip our students to meet the demands of a future-facing workforce. The broad array of courses grants students the flexibility to tailor their education to their interests and career aspirations. Through conducting a capstone research project, students have the opportunity to immerse themselves in the research group of our renowned professors, gaining hands-on training in advanced chemical instrumentation, modern materials synthesis, bioanalytical methods, and more.

Q: What sets this programme apart from similar courses?

A: This programme uniquely combines cutting-edge research with practical applications, preparing students not just to understand chemical technologies but to innovate and lead in their respective fields.

Q: What career path can I expect after finishing the programme?

A: Talents with a strong chemistry background, laboratory skills and an innovative mindset are highly valued by many employers in social and private sectors, such as health and energy-related industries. In particular, graduates can pursue careers in pharmaceuticals, materials science, biotechnology, research and development, quality assurance, and even entrepreneurship in tech startups.

EMPOWER YOUR FUTURE

with Our Innovative Master's Degrees

MSc in the field of **Applied Geosciences**

MSc in **Artificial Intelligence**

MSc in the field of **Chemical Technologies for Health & Materials** ^{NEW}

Master of **Data Science**

MSc in **Environmental Management**

MSc in the field of **Food Industry: Management & Marketing**

MSc in the field of **Food Safety & Toxicology**

MSc in the field of **Physics**

Master of **Statistics**

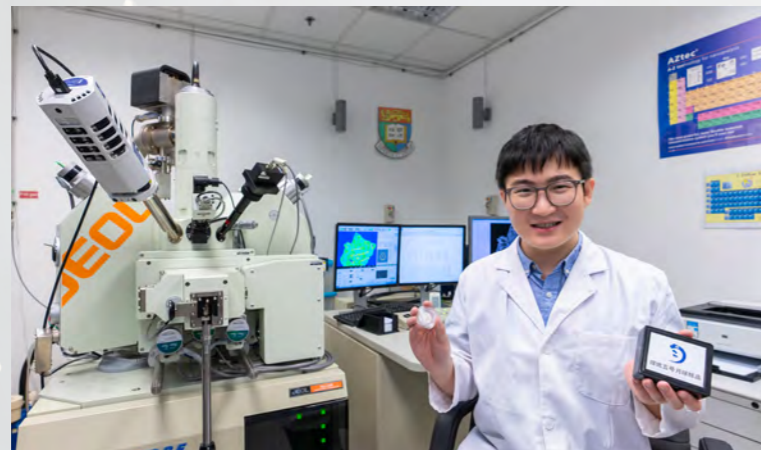
YOUNG EXPLORERS OF THE COSMOS: DELVING INTO THE BILLIONS-YEAR-OLD UNIVERSE

BUDDING PLANETARY GEOLOGIST BECOMES HONG KONG'S FIRST RESEARCHER TO UNVEIL MOON'S VOLCANIC HISTORY WITH RETRIEVED LUNAR SAMPLES

Dr Yuqi QIAN, Postdoctoral Fellow at the Department of Earth Sciences and the Laboratory for Space Research
Research foci: Planetary Volcanism, Planetary Geology, Planetary Chemistry, China's Lunar and Planetary Exploration

As a child, Dr Yuqi QIAN, Postdoctoral Fellow at the Department of Earth Sciences, would gaze up at the night sky in awe, captivated by its vastness and the mysteries it held. Simultaneously, he would marvel at the Earth and its formation, wondering what secrets lay beyond our world. This sense of wonder never left him, and as he grew older, his passion for unravelling the mysteries of the universe only grew stronger.

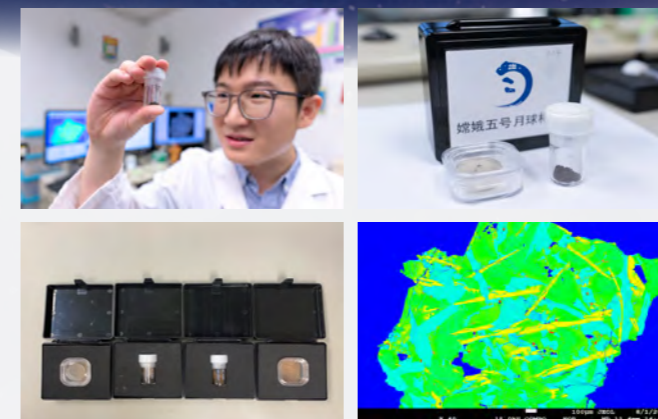
With the guidance of his supervisor Professor Joseph MICHALSKI, Yuqi formed a team in 2022 and competed for lunar soil samples collected by the Chinese lunar probe Chang'e-5 in 2020. After a rigorous selection process, in June 2023, Yuqi and his team received approval from the China National Space Administration's Lunar Exploration and Space Engineering Centre to study the lunar soil samples, which collectively weigh 822.6 milligrammes. This remarkable achievement marks the first time a research team from Hong Kong has obtained such valuable lunar samples, which hold immense value in unravelling the geological and thermal history



of the Moon, as well as its connection to the formation and evolution of other celestial bodies within the Solar System. Growing up in a small town in northern Zhejiang Province, Yuqi was fascinated by nature and space, nurturing his passion for exploration. His insatiable curiosity led him to delve into books

on the origins of life and science fiction, igniting his imagination about humanity's future and our planet. These experiences inspired his deep-seated desire to study geology, a field that explores the origins and destiny of Earth and life itself.

During his undergraduate studies, Yuqi focused on studying volcanism on Earth. It was during this time that lunar and planetary science in China began to flourish, driven by the expanding Chinese lunar programme. Recognising the immense opportunities for lunar research both in China and globally, he firmly believed that these developments would pave the way for scientific and technological breakthroughs that would ultimately benefit all of humanity.



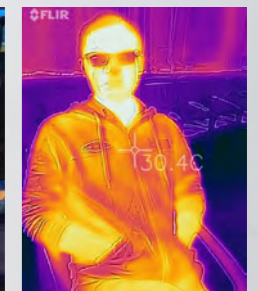
'The Moon, our closest celestial neighbour, is the best-understood planetary body aside from Earth. It is hypothesised to have formed from a massive collision between proto-Earth and a Mars-sized planet, Theia. Therefore, studying the Moon's geology holds secrets about our own planet,' Yuqi explained, expressing his eagerness to contribute to this grand expedition. Before completing his doctoral degree in planetary geology and comparative planetology, Yuqi achieved a breakthrough by examining impact melt beads from Chang'e-5 soil samples. He collaborated with his teammates and discovered that their ages indicate an increase in impact flux within the Earth-Moon system around 600 million years ago, which may have contributed to the extinction of the dinosaurs. This finding further fuelled Yuqi's determination to contribute to the exploration of space and unravel the mysteries of our cosmic neighbourhood.

'The 21st century is truly the century of space exploration. I am eager to contribute to humanity's journey, beginning with the Moon, then Mars, and beyond. I eagerly anticipate the first human return to the Moon in the next decade and the establishment of lunar bases by 2035, with significant contributions from China. If we can conquer the challenges of surviving on the Moon, why not extend our reach to explore the vast depths of space?'

'As a budding planetary geologist, I feel fortunate to be entering my career at a time when the world is rapidly advancing its efforts to colonise the Moon.'



Yuqi's research has caught the media's eye, and he frequently shares his expertise through interviews.

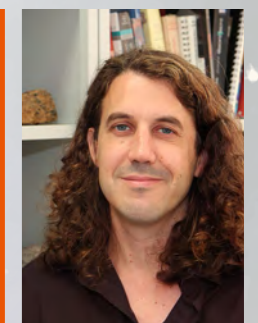


Thermal infrared photo of Yuqi in 2017, when he was a senior undergraduate student, taken at a seminar of Mars thermal infrared remote sensing.



◀ Learn more

Supervisor:
Professor Joseph MICHALSKI
Professor of the Department of Earth Sciences and Deputy Director of the Laboratory for Space Research





‘Astronomy is the most humbling science. Developing humility is a fundamental requirement to break paradigms and take humanity to the next level.’

FINDING DARK MATTER IN THE COSMIC HIDE-AND-SEEK

Alfred AMRUTH, PhD student in the Department of Physics and the Laboratory for Space Research
Research foci: Dark Matter, Gravitational lensing, HPC simulations

Alfred AMRUTH, a PhD student in the Department of Physics, is dedicated to unravelling the mysteries of Dark Matter. Using gravitational lensing, a prediction of Einstein’s theory of general relativity where massive objects can bend the path of light, Amruth strives to shed light on this elusive substance that constitutes approximately 85% of the Universe’s mass.

Dark Matter cannot be explained by the Standard Model of Particle Physics and cannot be directly observed. Nevertheless, the existence of Dark Matter can be inferred from its gravitational effects on light from distant galaxies. While the conventional hypothesis proposes that Dark Matter is composed of ultramassive (super heavy) particles, Amruth’s recent research, under the guidance of Professor Jeremy LIM from the Department of Physics, challenges this idea.

Collaborating with renowned astrophysicists, Amruth and his team analysed the positions and brightnesses of multiply-lensed images of background galaxies produced through gravitational lensing by individual foreground galaxies. Their research shows that models with ultralight Dark Matter particles closely match the observed phenomenon, challenging the belief that ultramassive particles are the primary Dark Matter candidates. They propose that Dark Matter may consist of ultralight particles behaving like waves during their cosmic journey.

Amruth’s latest research paper, featuring his findings, was published as the cover article in the prestigious journal *Nature Astronomy*. In recognition of his remarkable discoveries, he was awarded the 2023 Hong Kong Young Scientist Award in the Physical/Mathematical Sciences by the Hong Kong Institution of Science.

On the Path to Unordinary Matter

Amruth’s passion for science blossomed during his early days in Sri Lanka, where he was captivated by the enchanting night sky and celestial objects. This experience fuelled his fascination with the cosmos. He attributes his deep interest in science to his parents’ unwavering support, as they provided him with books, including a popular series by National Geographic and the Discovery Channel. These books covered various subjects and sparked his curiosity about the Universe. ‘What sealed the deal was sci-fi novels which had a profound impact on my imagination, especially those written by Arthur C Clarke, the father of

science-fiction, and world-renowned astronomer Carl Sagan’. Astrophysics holds a special fascination for Amruth, as it describes the laws governing our Universe and everything within it. Moreover, the timeless question of whether we are alone in the Universe has captivated Amruth more than anything else. ‘The answer to this question has to be discovered through astrophysics and pushed me to pursue research in astronomy.’

Amruth is captivated by the enigmatic nature of Dark Matter, recognising its potential as a catalyst for advancing human civilisation and unlocking the possibilities of space exploration. Just as the discovery of fire and electricity propelled human civilisation forward, Dark Matter has the potential to be the next milestone for humanity.

Amruth is actively collaborating worldwide to study wave-like Dark Matter in galaxies. His work has gained significant interest among scientists and is paving the way for exciting new scientific exploration. He credits his development as a scientist to his invaluable mentor, Professor Jeremy LIM, and the unwavering support of his collaborators, colleagues, and girlfriend.

Amruth’s career goal remains unchanged from his childhood: to gain a comprehensive understanding of the Universe. He is dedicated to continuing his research and teaching to inspire curiosity and passion in younger generations for as long as possible.

He humorously adds, ‘Answering this question of how the universe works would be much quicker if we were fortunate enough to discover intelligent extraterrestrial life willing to assist us in our quest for knowledge!’



Supervisor:
Professor Jeremy LIM,
Associate Professor of the
Department of Physics

Learn more ▶



‘My interest in understanding the galaxy evolution encoded in the rich “fossil” of the Milky Way.’

DELVING INTO THE COMPLEXITIES OF PLANETARY NEBULAE

Shuyu TAN, Research Assistant at HKU Laboratory for Space Research
Research Focus: The evolution of the Milky Way



When stars reach the end of their lives, they exhaust their nuclear fuel and expel outer layers of gas and dust into space, forming planetary nebulae (PNe) with diverse shapes and properties. These PNe often align in a striking and seemingly coordinated manner, as if they are following a cosmic pattern, which remained a mystery to astrophysicists for a long time. However, a recent study led by Shuyu Tan at LSR uncovered insights into this enigma.

By analysing extensive data collected over the last decade, Shuyu’s team found that PNe with close binary stellar companions — pairs of stars orbiting closely, exhibit a pronounced alignment.

This discovery suggests the influence of a persistent and strong magnetic field at the centre of our Galaxy in shaping these nebulae. Shuyu’s study paves the way for further exploration of this phenomenon, enhancing our understanding of the origin and evolution of the Galactic magnetic field and its role in star formation.

A Journey of Chasing Cosmos

Shuyu was intrigued by the interconnections of seemingly unrelated phenomena from an early age. ‘Even the use of standard candles piqued my interest as they demonstrated a way of thinking that navigated the known amidst the vast sea of the unknown.’

Shuyu’s decision to major in physics was driven by her ambition to understand the universe. During her second year of undergraduate studies at Imperial College UK, her research project using Gaia data released two uncovered snail-shell structures in the phase space of stars, hinting at a disturbance from the Sagittarius dwarf galaxy 500 million years ago. ‘Since then, my interest in understanding the galaxy’s evolution, as encoded in the rich “fossil” of the Milky Way, including resolvable stars and the interstellar medium, has been ignited.’

She took pleasure in utilising statistical and computational tools for astrophysical research during her MPhil studies at HKU Physics, refining her skills in extracting information from publications, comprehending prior studies, and interpreting observational data. This marked her initial



A collage shows 22 individual well-known PNe, artistically arranged in a spiral pattern by order of approximate physical size. Image credit: ESA/Hubble and NASA, ESO, NOAO/AURA/NSF.

venture into observational astronomy, where she discovered the potency of data science and top-tier observations, attracting her to theoretical approaches and astrostatistics.

Currently serving as a Research Assistant at LSR under the supervision of the Director Professor Quentin PARKER, she recently collaborated with him to solve a 20-year-old astrophysical puzzle regarding low sulfur levels in PNe. By leveraging the state-of-the-art European Southern Observatory 8m Very Large Telescope in Chile, they traced the anomaly to poor data quality, disproving previous claims of underestimated ionisation stages or

weak fluxes. Their findings offer vital insights into PNe composition, emphasising the significance of meticulous analysis in astrophysics.

In her current role, Shuyu describes her work as a blend of monotony and excitement. She elaborates, ‘While the tasks can sometimes feel repetitive, I find the challenge of adapting and applying innovative data analysis methods from various sources intellectually stimulating. This constant quest for improvement and innovation keeps me engaged.’

As Shuyu continues to delve deeper into the enchanting realm of astrophysics, she dreams of unravelling the universe’s hidden mysteries, igniting a passionate pursuit to soar beyond the stars, both for herself and the cosmic dreamers of tomorrow.



◀ Learn more

Supervisor:
Professor Quentin PARKER, Director and
Professor of the HKU
Laboratory for Space Research



ACCOMPLISHMENTS

External Awards and Honours

In a remarkable display of academic excellence, five Professors and two affiliated Professors from our Faculty have achieved top honours in the 2023 Best Scientists Rankings within their respective fields globally. The ranking is based on a scientist's D-index (Discipline H-index), which includes only publications and citation data for a specific discipline.

Additionally, Clarivate Analytics has recognised eight of our esteemed scientists, including five academics and three affiliated scholars, as the most influential researchers in the world in its '2023 Highly Cited Researchers' list. Highly Cited Researchers are selected for their exceptional research performance, determined by the production of multiple highly cited papers that rank in the top 1% by citations for field and year in Web of Science. These accolades serve as a testament to the dedication, expertise, and impactful contributions of our scholars, further solidifying our position as a global leader in academic excellence.

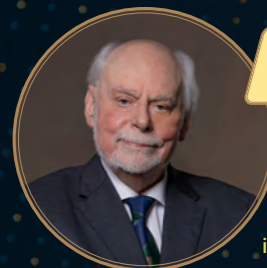


Professor Chi-ming CHE

Zhou Guangzhao Professor in Natural Sciences, Chair Professor of Chemistry
2023 Best Scientists – ranked 65th globally in Chemistry

Professor Hongjie DAI

Chair Professor of Chemistry
2023 Best Scientists – ranked 11th Globally in Materials Science
2023 Highly Cited Researchers in the field of Chemistry



Professor Sir Fraser STODDART

Chair Professor of Chemistry
2023 Best Scientists – ranked 18th globally in Chemistry
2023 Highly Cited Researchers in the field of Chemistry



Professor Guochun ZHAO

Chair Professor of Earth Sciences
2023 Best Scientists – ranked 10th Globally in Earth Science
2023 Highly Cited Researchers in the field of Geosciences



Professor Min SUN

Professor of Earth Sciences
2023 Best Scientists – ranked 18th globally in Earth Science

Professor Peng GONG

Vice-President and Pro-Vice-Chancellor (Academic Development), Chair Professor in both Faculty of Science and Faculty of Social Sciences
2023 Best Scientists – ranked 70th globally in Environmental Sciences
2023 Highly Cited Researchers in the field of Geosciences



Professor Wang YAO

Chair Professor of Physics
2023 Highly Cited Researchers in the field of Physics



Professor Shuang ZHANG

Interim Head and Chair Professor of Physics
2023 Highly Cited Researchers in the field of Physics



Professor Xiang ZHANG

President and Vice-Chancellor of HKU, Chair Professor in both Faculty of Science and Faculty of Engineering
2023 Best Scientists – ranked 87th globally in Physics
2023 Highly Cited Researchers in the field of Physics

Professor Xiaobo YIN

Associate Vice-President of HKU and Professor in both Faculty of Science and Faculty of Engineering.
2023 Highly Cited Researchers in the field of Cross-Field



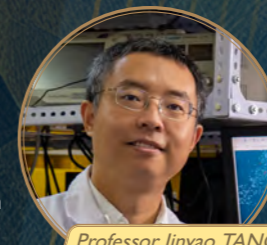
External Awards and Honours



Professor Wang YAO

Professor Wang YAO, Chair Professor of the Department of Physics, was selected for **Tencent's New Cornerstone Investigator Program 2023**, which aims to promote basic research spearheaded by leading scientists. Besides this achievement, Professor Yao was also honoured with the prestigious **Huang Kun Prize** by the Chinese Physical Society. The Prize, named in honour of the late Chinese physicist and pioneer of China's Semiconductor Physics Professor Huang Kun, serves as recognition and reward for exceptional achievements in solid-state physics and semiconductor physics.

Professor Jinyao TANG, Associate Professor of the Department of Chemistry, was announced as a recipient of the **BOCHK Science and Technology Innovation Prize in New Materials and New Energy** for the year 2023. His exceptional research in the field of active colloidal materials garnered recognition for its innovative and transformative contributions.



Professor Jinyao TANG



Professor Hongzhe SUN

A team led by Professor Hongzhe SUN, Norman & Cecilia Yip Professor in Bioinorganic Chemistry and Chair Professor of the Department of Chemistry, was elected by the Royal Society of Chemistry (RSC)'s Dalton Prize Committee to receive the **2023 Horizon Prize**. The team was honoured for their pioneering research on the medicinal chemistry of bismuth and its application in the treatment of COVID-19, as well as the identification of target sites in SARS-CoV-2 enzymes using metallomics methods.

Professor Xiang David LI, Professor of the Department of Chemistry, was awarded the **Tetrahedron Young Investigator Award 2024** for his exceptional contributions to the field of Bioorganic and Medicinal Chemistry. The award is given to just two individuals each year who have exhibited 'exceptional creativity and dedication' in the fields of organic synthesis and bioorganic and medicinal chemistry, respectively. The previous awardees included Nobel Prize winners in Chemistry.



Professor Xiang David LI



Professor Jimmy JIAO

Professor Jimmy JIAO, Professor of the Department of Earth Sciences, received two prestigious accolades for his contributions to the field of hydrogeology. These include the **M King Hubbert Award** by the National Ground Water Association in the United States and the **O E Meinzer**, the highest international honour for hydrogeologists.



Professor Joseph MICHALSKI

Professor Joseph MICHALSKI, Professor of the Department of Earth Sciences, received the **Xplorer Prize 2023**, becoming the first non-Chinese recipient of this esteemed accolade. The prize acknowledged his significant contributions to the field of planetary science and the study of Mars.

Professor Guochun ZHAO, Chair Professor of the Department of Earth Sciences, was elected as a **member of Hong Kong Academy of Sciences**. This prestigious membership recognised his highly renowned expertise in the field of geoscience and was bestowed by his peers in Hong Kong.



Professor Guochun ZHAO



Professor Xuechen LI

Professor Xuechen LI, Professor of the Department of Chemistry, was awarded the **Innovation Award by the Peptide Alliance of China** at 9th Tides China 2023. This award served as a testament to Professor Li's exceptional and valuable contributions in the field of peptide synthesis and peptide drug development.

A joint study revealing a new mechanism on DNA Replication Initiation, led by Professor Yuanliang ZHAI of the School of Biological Sciences and his collaborators at the Hong Kong University of Science and Technology and other institutions, was selected as one of the **'Top 10 Scientific Advances in China for 2023'**, making it the only research project from Hong Kong to be included in the list. Organised by the National Natural Science Foundation of China, the selection is jointly hosted by the High Technology Research and Development Center and the Center for Science Communication and Achievement Transformation, with the support of five journals.



Professor Yuanliang ZHAI



Professor Zhongxing HUANG

Professor Zhongxing HUANG, Assistant Professor of the Department of Chemistry, was honoured with the **2023 Chinese Chemical Society Young Chemist Award** in recognition of his achievements in the synthesis and application of novel chiral dinuclear metal catalysts. This placed him among the ten outstanding young chemists who received this recognition.



Learn more on 2023 Clarivate Highly Cited Researchers



Learn more on 2023 Best Scientists Rankings

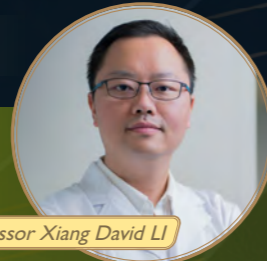
ACCOMPLISHMENTS

Internal Awards

The HKU Excellence Award Scheme 2023

Professor
Hongzhe SUN

Professor Hongzhe SUN, Norman & Cecilia Yip Professor in Bioinorganic Chemistry and Chair Professor of Chemistry, was honoured with the **HKU Innovator Award**, acknowledging his innovations demonstrating exceptionally high potential impact (legacy or projected legacy) and transformative results that foster development.



Professor Xiang David LI

Professor Xiang David LI, Professor of the Department of Chemistry, was awarded the **Outstanding Researcher Award** in recognition of his outstanding research accomplishments.



Professor Junzhi LIU

Professor Junzhi LIU, Assistant Professor of the Department of Chemistry, was honoured with the **Outstanding Young Researcher Award**, acknowledging his promising potential in his research field accomplishments.

Professor Aleksandra DJURIŠIĆ, Professor of the Department of Physics, was awarded the **Faculty Research Output Prize** for her research titled 'Monolithic perovskite/organic tandem solar cells with 23.6% efficiency enabled by reduced voltage losses and optimised interconnecting layer', which was published in *Nature Energy* 2022.



Professor Aleksandra DJURIŠIĆ

Professor Ying Wai CHAN, Assistant Professor of the School of Biological Sciences, was awarded the **Early Career Teaching Award**, under the Teaching Excellence Award Scheme, which is designed to recognise individuals for their potential for leadership in teaching as well as their past achievements.



Professor Ying Wai CHAN

Faculty Awards on Teaching Excellence and Outstanding Performance

Dr Rocky LAW, Senior Professional Practitioner of the Faculty of Science, was honoured with the **Award for Teaching Excellence 2022-23** for his dedication to high-quality of teaching.



Dr Rocky LAW

Professor Xiaoming YUAN, Head and Professor of the Department of Mathematics was recognised by the **Faculty Knowledge Exchange Award 2022-23** for his research regarding the impact of operator splitting algorithms in Huawei cloud's live streaming business.



Professor Xiaoming YUAN

Professor Zhongxing HUANG, Assistant Professor, and former Postdoctoral fellow Dr Pengwei XU of the Department of Chemistry were awarded the Faculty's **Research Output Prize 2021-22** for honouring their exceptional work in the research project 'Catalytic reductive desymmetrisation of malonic esters', which was published in *Nature Chemistry*, 2021.



Professor Zhongxing HUANG



Dr Pengwei XU

Dr Isis Aline Clemence
GUIBERT

Postdoctoral fellow Dr Isis Aline Clemence GUIBERT and PhD student Miss Even LEUNG of School of Biological Sciences received the **Excellent Teaching Assistant Awards 2022-23** for their enthusiasm in providing teaching support in classes.



Miss Even LEUNG



Mr Raymond CHAN

The **Award for Outstanding Professional Services Staff 2022-23** was presented to Mr Raymond CHAN, IT Manager of the Faculty of Science, in recognition of his ongoing dedication to providing technical solutions to the Faculty throughout the years.

STUDENTS' ACHIEVEMENTS

HKU Students Captured Gold Medal in International iGEM Competition 2023

A multidisciplinary team of HKU students, including members from the Faculty of Science, won a **Gold Medal** at the International Genetically Engineered Machine (iGEM) Competition Grand Jamboree 2023. Their winning project aimed to improve solid tumour treatment through genetically engineering macrophages with CAR and SIRPα blocker, aiming to enhance immunotherapy methods. Their dedication, hard work, and commitment to wet lab work, science communication, and education have led to this well-deserved recognition.



Actuarial Science Students Thrived in CASH Algo Trading Challenge 2023 with Winning Strategy

The HKU Team 'MASS', comprising Muhammad HUSSAIN and Hassan Ali NAEEM, both second-year students majoring in Actuarial Science in the Department of Statistics and Actuarial Science, collaborated with HKU Faculty of Engineering, achieved remarkable success in the CASH Algo Trading Challenge 2023, a global competition for algorithmic trading. They were crowned **Grand Champions** and received **Silver Awards in both Best Return and Best Sharpe categories**. The team's dedication over a span of nearly four months, involving extensive backtesting and careful monitoring, led to the development of a winning trading strategy.



From the left: Hassan Ali NAEEM and Muhammad HUSSAIN, both from the Department of Statistics and Actuarial Science, Faculty of Science; Shah Jahan ISHAQ is a second-year student of the Department of Computer Science, Faculty of Engineering.

Biological Sciences PhD Graduate Awarded Prestigious Grant by Malacological Society of London in 2023

PhD graduate Dr Bovern ARROMRAK from the School of Biological Sciences was awarded the **Early-Career Research Grant** by the Malacological Society of London in 2023. This highly competitive grant is conferred on students and researchers who have demonstrated exceptional potential and achievements in their respective fields.

A major part of Bovern's research centres around understanding the interaction between animal hosts and their associated microbial community in high thermal environments, with implications for unravelling tolerance mechanisms in warming oceans. The awarded grant was applied with the support of Bovern's PhD supervisor, Professor Juan Diego GAITÁN-ESPITIA; currently, Bovern is a Postdoctoral fellow supervised by Professor Bayden RUSSELL.



PhD Student Won Best Talk Award at AsiaEvo Conference for Research on Germline Mutation Rates in Sticklebacks

PhD student Chaowei Charlene ZHANG from the School of Biological Sciences was honoured with the **Best Talk Award** at the Third AsiaEvo Conference held in December 2023 at the National University of Singapore.

She won the award by presenting her research paper titled 'Pedigree-based Germline Mutation Rate in Sticklebacks,' which shed light on the significance of accurately estimating mutation rates in genetics. Her findings served as a valuable resource for researchers studying fish population genetics, especially in the context of sticklebacks. Charlene is supervised by Professor Juha MERILÄ in the Area of Ecology and Biodiversity.



FRESH FACES ABOARD

Professor Tim Jaij BOONEN,
Associate Professor of the Department of Statistics and Actuarial Science

'In moving to Hong Kong, I had to give up my hobby to attend around 25 football matches in the stadium.'

'My aim is to analyse complex challenges, forging a connection between science and society.'



- PhD in Actuarial Science from Tilburg University, the Netherlands
- Focuses on applications of game theory, capital allocation, longevity risk modelling, and risk sharing
- Worked for nearly 10 years as an Assistant/Associate Professor at the University of Amsterdam in its School of Economics (2013-2023)

'Curiosity is the fuel for good science.'

- PhD in Statistics from the University of Oxford; Master of Engineering from the University of Cambridge
- His speciality lies in Bayesian statistics, which serves as a flexible tool for quantifying uncertainty in decision-making. His research focuses on developing scalable and robust Bayesian methodologies to tackle modern data science problems
- Before joining HKU, he worked as a lead data scientist at Novo Nordisk, where he developed novel statistical methods for clinical trials



Professor Edwin Chung Hang FONG,
Assistant Professor of the Department of Statistics and Actuarial Science

'I am a keen rock climber, and I particularly enjoy bouldering. I like that it's both a physical and mental challenge, which makes it super fun!'



Professor Meng GU,
Assistant Professor of the Department of Physics

'When I'm not working on research, I enjoy traveling with my family, cooking and baking sometimes. I also like to watch movies and hit the gym.'

'Embrace curiosity, unlock the universe's story, and enjoy the journey.'

- PhD in Astronomy & Astrophysics, Harvard University
- Focuses on galaxy formation and evolution, specifically being interested in the star formation and mass assembly histories of quiescent galaxies. She is also an observer and aim to learn the stellar population and chemistry of galaxies through their spectra
- Before joining HKU, she was a postdoctoral fellow at Carnegie Observatories, and a Henry Norris Russell postdoctoral fellow in the Department of Astrophysical Sciences at Princeton University

Professor Yu GU,
Assistant Professor of the Department of Statistics & Actuarial Science

'In my free time, I love delving into literature and arts to seek inspiration and knowledge. Cute animals also bring a smile to my face and brighten my day.'

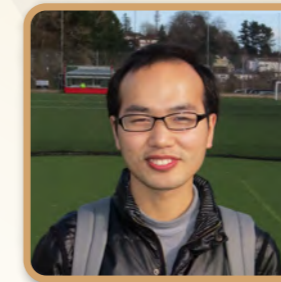


'Unleashing the formidable power of statistics can propel public health and push forward the frontiers of medical knowledge.'

- PhD in Biostatistics from the University of North Carolina at Chapel Hill, United States
- Specialises in survival analysis, semiparametric inference, and biostatistics; developing novel statistical methods for analysing complex data in modern medical and health-related research
- During her PhD study (2018-2023) amidst the COVID-19 peak, she led statistical analyses to investigate vaccine and treatment efficacy. She also actively participated in a multi-ethnic genome-wide association study on early childhood caries

Professor Yunwen LEI,
Assistant Professor of the Department of Mathematics

'I find joy in playing football, hiking and listening to music. These simple pleasures bring a touch of delight to my life.'



'Keep your face always toward the sunshine, and shadows will fall behind you.'

- PhD in Computer Science from the Wuhan University, China
- Specialises in machine learning, stochastic optimisation, mathematics of data science and statistical learning theory
- Worked as a Lecturer at the University of Birmingham (2020-2022), and as a Humboldt Research Fellow at the University of Kaiserslautern (2019-2020)

'Planetary Science invites us on an enthralling journey beyond Earth, aiming to benefit not just our planet, but also the magnificent wonders of the cosmos.'

- PhD in Geophysics from Peking University, China
- Specialises in planetary space science, and particularly on Jupiter
- Formerly a Marie-Curie COFUND fellow at the University of Liege, Belgium (2016-2019), and a Research Professor in the Institute of Geology and Geophysics, Chinese Academy of Sciences (2019-2023)



Professor Zhonghua YAO,
Associate Professor of the Department of Earth Sciences

'While exploring other planets, I still can't resist the joy of exploring and comparing different human cultures on Mother Earth!'

Professor Jason Jian ZHANG,
Professor of the Department of Earth Sciences

'Football brings me a lot of fun. Engaging in the sport involves camaraderie and teamwork, as you join or form teams to compete and collaborate with others who share the same passion. It provides opportunities for social interaction, building relationships, and connecting with other enthusiasts.'



'Deciphering the internal mystery of our dynamic planet, making the invisible visible and the unknown known.'

- PhD in Structural Geology and Tectonics from The University of Hong Kong
- Formerly a postdoctoral researcher at the University of Waterloo (2008-2010) and a professor at Sun Yat-sen University (2016-2023) leading a research group focusing on the early Earth tectonics
- Specialises in crustal evolution, deformational behaviour and geodynamic process of the Earth and its role in shaping the present-day habitable planet

'Embracing the unreasonable effectiveness of Mathematics to illuminate the path to scientific discovery and empirical understanding!'

- PhD in Physics from The University of Hong Kong
- Focuses on the fundamental questions related to symmetry and topological structures in solid-state physics. In recent years, he has developed a series of theories on projective crystal symmetries and the related novel topological phenomena
- Formerly a postdoctoral researcher at the Max Planck Institute for Solid State Physics, Germany (2015-17) and Professor in the School of Physics at Nanjing University (2017-2023)



Professor Yuxin ZHAO,
Associate Professor of the Department of Physics

'I love the board game Go, as it beautifully demonstrates how a set of simple rules can give rise to an enormous and diverse world.'

COLUMN:
MOVING SCIENCE FORWARD

FUELLING A PASSION FOR RESTORING MARINE ECOSYSTEMS



Image credit: Paul Sedille / Archireef

Since her childhood, a deep love for the sea has been rooted in Vriko's heart, immersing herself in the enchanting underwater world and adoring the vastness of the sea. This profound connection has shaped her path in unimaginable ways, leading her to pursue PhD studies in marine science and co-establish the world's first 3D-printed Reef Tile to restore degraded marine ecosystems. Driven by a powerful epiphany and steadfast determination, she embarked on a journey to find innovative solutions. This interview uncovers her captivating tale of discovery and unwavering commitment to sustainable development, one step at a time.

'I was born and raised in Hong Kong in the 90s,' reminisced Vriko Yu, the CEO of Archireef. 'It was a fascinating time, especially in Hong Kong, as I witnessed both the development and the preservation of nature. Spending significant time in nature during my childhood showed me the possibility of sustainable development in an urbanised city without compromising our natural capital.'



Image credit: Archireef

I find it fulfilling to bring a research product into a commercial avenue for a greater cause, and that's for our environment.

Creating a Nature-Positive Future

'My epiphany moment occurred in 2014,' Vriko revealed with a hint of sadness. 'I witnessed a small patch of coral community disappear in just two months. That experience and first-hand observations of climate change solidified my dedication to restoring degraded marine ecosystems, with a particular focus on coral reefs.'

She further explained, 'Working closely with my supervisor, Professor David BAKER at School of Biological Sciences of The University of Hong Kong, I initiated my PhD research and co-developed a research product in collaboration with Ms Lidia RATOI and Mr Christian LANGE at Faculty of Architecture. I then co-founded Archireef as a vehicle to bridge the gap between research ideas into commercial solutions. This endeavour allowed me to combine impactful ideas with a strong research foundation developed.'



Image credit: Archireef



Image credit: Keith Kei / Archireef

Revitalising Marine Life with Reef Tiles

'Our innovative solution is elegantly simple,' Vriko stated confidently. 'We create earth-friendly, clay-based, 3D-printed clay tiles, which we call reef tiles. These tiles are a suitable substrate for corals and other marine life to thrive. Beyond providing a habitat for corals, they create micro crevices and microhabitats for diverse marine biodiversity, including fish, crabs, tiny shrimp, and snails.'

She emphasised, 'Coral restoration is not limited to the reefs themselves; it extends to the associated biodiversity. Our research team at HKU aims to solve a local problem while developing an adaptable and scalable solution to address global coral degradation.'



▲ Website of Archireef



▲ Full story

Vriko passionately expressed, 'Our goal is to create a positive future for nature, where everyone, not just those in academia or conservation, can contribute to the restoration of our marine ecosystems.'

Restoring Nature's Beauty, One Tile at a Time

Reflecting on their accomplishments, Vriko shared, 'When we first deployed the 3D-printed reef tiles with the support of the Hong Kong government in 2019, it was a pivotal moment. Returning to the site three months later, we were thrilled to find that not only were the corals surviving, but we also achieved a remarkable 95% survivorship rate after three years. This is at least four times higher than traditional methods.'

She added with a sense of fulfilment, 'Beyond the corals, we have witnessed the return of marine life, with snails, fish, and other creatures colonising the area. It's not just about the coral; it's about the tangible and measurable impact we're generating, especially in bringing back biodiversity.'

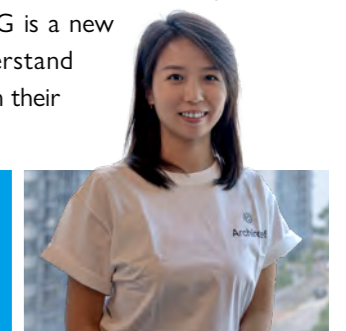
As Vriko and her team at Archireef continue their journey towards a nature-positive future, their innovative solution and dedication to restoring marine ecosystems inspire us to consider sustainable development and preserving our natural capital.

Raising Awareness of Environmental Responsibility

As the global trend towards Environmental, Social, and Governance (ESG) continues to gain momentum, Vriko's innovative solutions offer a proactive approach to bringing positive impact to the environment. By providing nature-based financial disclosure, Archireef is helping both corporate clients to understand the impact they can have on the environment and contribute back in a tangible and positive way.

'When it comes to the nature, it is not really owned by a single entity, but it is heavily embedded in our daily lives and business operations. I think ESG is a new matrix for everyone to understand the impact they can have within their value chain,' Vriko concluded.

Miss Vriko YU
· Co-founder and CEO of Archireef
· PhD candidate at the School of Biological Sciences



THE ART OF SPARKLING TEA: A FUSION OF SCIENCE AND CRAFTSMANSHIP



Lifestyle embodies an attitude, and the philosophy behind business operations is truly invaluable. When we merge these principles and infuse mindfulness into our everyday existence, we ignite genuine sparks in our lives. In an enlightening conversation, Winston LAU, the visionary CEO of Mindful Sparks, shared the essence of his company's mission. We are excited to delve into the origins of his inspiring venture and uncover the captivating story behind it.

As a Food and Nutritional Science graduate from HKU, Winston's love for wine sparked a desire to develop an exquisite beverage to those who sought an alcohol-free yet sophisticated option. 'What we're trying to do is to maximise the flavour experience that people can enjoy, the aroma, the taste, and the aftertaste during fine-dining food pairings,' said Winston.

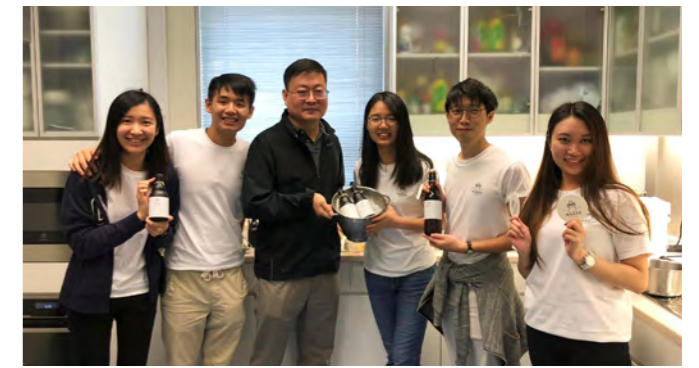
A Journey Fuelled by Passion and Purpose

'By utilising a multidimensional extraction technique and focusing on the full potential of Chinese tea, we aim to elevate the tea-drinking experience to a fine-dining level,' Winston revealed the meticulous craftsmanship behind Mindful Sparks' sparkling tea. Through a unique extraction method named 'Layer Six Extraction', developed in collaboration with Professor Jetty LEE of the School of Biological Sciences, the team extracts the polyphenols — the nutrients and complex flavours — from tea leaves. This process, combined with a three-day maturation and delicate carbonation, results in a champagne-like sparkling tea that exudes sophistication.

As a graduate in food science, Winston consistently prioritises upholding a strong food safety management system. 'Despite our relatively short two-year establishment, we've successfully secured ISO 22,000, HACCP and HALAL



Elevate and innovate tea traditions to create a healthy luxury lifestyle, a new culture to the world!



New product Development and Sensory Evaluation, in the second semester of 2018.

certifications – a noteworthy accomplishment for a company of our size,' remarked Winston. He highlighted that these certifications are pivotal in advancing the company's food safety management and production processes, facilitating collaborations with leading top hotel chains and retailers. Furthermore, Mindful Sparks has achieved a significant milestone by becoming the first non-alcoholic sparkling tea brand to partner with The Michelin Guild Hong Kong & Macau in 2024.



The Intersection of Science, Sustainability, and Innovation

Drawing from his scientific background, Winston shared how his Food and Nutritional Science education contributed to his business operations. 'My scientific training at HKU equipped me with critical thinking skills and a problem-solving mindset that are invaluable in the business world,' explained Winston. The knowledge gained in food chemistry, marketing, and sensory evaluation courses empowered him to develop innovative solutions, such as the upcycling of cacao waste into the Blood Orange Cacao Husk Sparkling Tea.



Winston emphasised the importance of aligning one's academic pursuits with personal interests and career goals. 'My four years of studying food and nutritional science not only broadened my knowledge but also provided a solid foundation for my entrepreneurial journey,' highlighted Winston.

Dedicated to complexity, flavour, and sustainability, Winston has skillfully established a presence in the non-alcoholic beverage market, presenting a luxurious and health-conscious alternative. His journey is a source of inspiration for individuals aspiring to blend their passions with academic pursuits, paving the way for a fulfilling and impactful career. Mindful Sparks' sparkling tea leaves us with an elevated appreciation for the artistry and innovation encapsulated in every sip.



◀ Website of Mindful Sparks



◀ Full Story

Mr Winston LAU
 · Founder and CEO of Mindful Sparks
 · BSc alumnus (major in Food and Nutritional Science)



COLUMN:
SCIENCE PROFESSIONALS@WORK

NAVIGATING THE SKIES WITH HEART: THE PATH TO METEOROLOGY

Breaking the ice with someone new often starts with a familiar topic. So, when I met Christy LEUNG, an alumna of the Department of Physics, for the first time, I chose a classic opener: the weather. 'Looks like it's going to cool down tonight,' I remarked. While most might just nod, Christy, being a meteorologist, had a different take.

'Actually,' she said, 'the temperature's set to drop tonight to around ten degrees. And there's rain with windy condition in the forecast, too.' After a brief pause, she smoothly transitioned into a fascinating insight, 'That means we'll feel colder than what the thermometer shows, thanks to the apparent temperature, which takes into account relative humidity and wind speed.' Her professionalism left a lasting impression; it was like talking to a meteorological wizard, getting real-time forecasts and valuable educational insights.

What made the perfect 'Miss Weather'?

As a Scientific Officer at the Hong Kong Observatory (HKO), Christy embodies the role of a serious scientist in meteorology. Yet, it is her role in HKO's TV weather programme 'Weather On-Air' that truly engages audiences. This carefully crafted programme provides free TV weather services to local stations, showcasing Christy's invaluable involvement. However, her role

goes beyond hosting. As a forecaster, she delves into weather analysis, scrutinising data and models. Through her expertise, she predicts weather patterns and keenly observes how subtle changes can influence Hong Kong's weather.

At first, transitioning into weather reporting felt daunting for Christy. 'My university training focused on scientific analysis and research, so facing the camera felt unnatural,' she admitted. Yet, with dedicated training and guidance, she mastered on-screen presence, breaking free from the academic stereotype and stepping confidently into the spotlight.

Leveraging her expertise in weather forecasting, Christy simplifies intricate meteorological scenarios, ensuring vital information reaches the public. Her mission is to bridge science with everyday life. 'I believe when both roles of weather forecaster and presenter blend seamlessly, one can rightfully earn the title of "Miss Weather".'

Christy now only makes occasional appearance for weather reporting, as her primary focus has shifted towards her

The sky might be divided by country borders, but meteorology doesn't recognise boundaries; it brings us all together under a single forecast.

role within the HKO International Aviation Meteorological Collaboration, which is under the Aviation Weather Services Branch.

Boosting Aviation Meteorology and Safety

One primary responsibility of her team is to support the Asian Aviation Meteorological Centre, which is co-established by the HKO and dedicated to delivering top-notch meteorological services to the aviation sector across the Asia-Pacific region. The goal is to reinforce flight safety and efficiency by providing high-quality meteorological assistance.

Christy fully dedicates herself to supporting her team, engaging in tasks ranging from monitoring aviation meteorology to developing aviation forecast products. In addition, she leads research efforts focused on various areas, such as turbulence and convection forecasting, utilising her findings to develop precise models that occasionally employ AI and coding. Through her multifaceted contributions, Christy plays a vital role in advancing aviation meteorology and flight safety.

Despite the development of modern technology in Hong Kong International Airport (HKIA), the Airport faced a challenging weather condition when it commenced operation in Chek Lap Kok as there is frequent wind shear and turbulence due to its close proximity and orientation towards Lantau Island. Pilots have quoted that HKIA is one of the most challenging landing spots. Consequently, the territory has seen the emergence of numerous aviation specialists. The HKO, in particular, stands out globally for its pioneering advancements on windshear and turbulence alerting technology using LIDAR (Light Detection and Ranging) and it is currently designated as the World Meteorological Organization Measurement Lead Centre for Doppler LIDAR Systems for Aviation Applications.

Christy was also involved in the development of an HKO's app, 'My Flight Weather' (MyFlightWx), the world's premier Electronic Flight Bag (EFB) Weather App developed by a meteorological

authority. Collaborating with Cathay Pacific, the app was officially launched in 2019, equipping flight crews with real-time weather updates, including airport weather reports, aerodrome forecasts, and alerts for hazardous weather conditions. The app covers the entire airways, including phenomena like volcanic ash and icing. This advancement has significantly improved aviation safety and efficiency.

Given the complexity of her work, I asked her to simplify it for the readers. She took a moment and said, 'I believe weather forecasting involves two main aspects: thorough observation and forecasting. This requires using instruments with latest technology to observe present conditions, such as ice on the runway or the rainfall. Once we have a clear understanding of present conditions, we can forecast the weather ahead as best we can.'

The Career Path of Meteorologist

Christy's interest in the Observatory sparked during her time in Form 2 while working on the school newspaper. She took

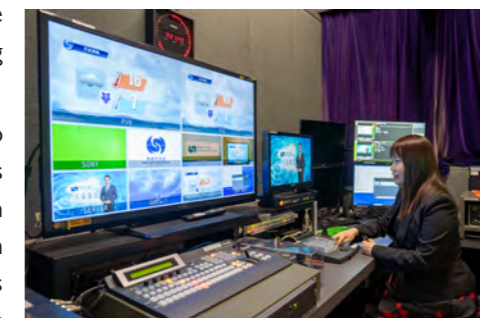
the initiative to email the then-director, Mr Chiu-ying LAM, and was granted the opportunity for an interview. Mr Lam suggested, 'If you want to work at the Observatory, you should study physics.' Inspired by her interest in relativity theory and her enjoyment of physics, Christy chose to pursue that field.

Today, Observatory positions extend beyond physics majors to include mathematics, meteorology, and nuclear science students. Yet, it is more than just academic background.

'This profession demands a genuine desire to serve the public and apply scientific knowledge in everyday life. Strong communication skills are also essential, as officers must be comfortable speaking publicly. It's about using hard

science to tackle real-world challenges, and that's what excites me.'

While weather may be dynamic and ever-changing, paving the way as a scientist is a predictable and step-by-step journey towards achieving one's goals.



Ms Christy LEUNG

- Scientific Officer at the Hong Kong Observatory
- Advanced Certificate in Emergency and Disaster Management, The Hong Kong Polytechnic University SPEED
- MSc in Applied Meteorology, University of Reading
- BSc in Physics and Astronomy, The University of Hong Kong

