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BE INSPIRED BY OUR PHD STUDENTS: BUILDING YOUR RESEARCH CAREER AT HKU

- HKU Presidential PhD Scholar Programme (HKU-PS)
- The Hong Kong PhD Fellowship Scheme (HKPFS)

FACULTY OF SCIENCE
THE UNIVERSITY OF HONG KONG
香港大學理學院

CONTENTS

MESSAGE FROM THE CHIEF EDITOR

Nurturing Students to Build Our Future!

This issue of Faculty of Science Newsletter highlights the unwavering commitment and efforts of our bright and talented postgraduate students. Beyond describing their innovative work, these fearless trailblazers also share the secret recipes that lie beneath their successes, the pivotal mindset needed in the face of difficulties, and the tips on acing interviews of postgraduate fellowship or scholarship. Be ready to be amused by the innovative work of the young scholars across our Science Departments and School!

One key mission of the Faculty is to provide an ideal platform for students to advance their research careers. We strongly support prospective students in applying for the Hong Kong Postgraduate Fellowship Scheme (HKPFS) and the HKU Presidential PhD Scholarship (HKU-PS) to achieve this. We firmly believe that investing in our students is the best way to leap forward, for the new discoveries that the next-generation scientists will bring might be far beyond our imagination.

Looking into the future, the Faculty aims to nurture experts in Science through launching two new MSc programmes, one in Artificial Intelligence, and the other one in Physics. While incubating science professionals is one key goal of the Faculty, science education is not just about conceptual theories and practical applications. In the Students Corner, you will learn how our undergraduate students apply their knowledge in making STEM education fun. Talking about making science exciting and approachable, in the Alumni Corner you will also hear a story on how a homegrown palaeontologist who studies dinosaur embryo hatched from HKU Science.

One of the greatest joys in teaching is to see mentees grow from novices into mature leaders. Educators play an important role as facilitators of knowledge to equip students with the know-hows and expertise. We also serve as cheerleaders to help students find their passion, in doing so, they can be self-motivated to explore the unknown and produce societal impact along the way. Let us take a moment to celebrate how our students evolve into the cornerstone of our society and shape our future!

Yours sincerely,

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

Be Inspired by Our PhD Students: Building a Research Career at HKU Science

What does the life of a PhD student look like? Some might regard it an extension of undergraduate studies. In this feature story, you will find that pursuing a PhD degree is way more challenging, yet much more fruitful than you can imagine. It is all about learning independently, questioning the boundaries of existing knowledge, embracing failure and pushing frontiers through collaborations.

With the support in different aspects, our recipients of HKU Presidential PhD Scholarship (HKU-PS) and the Hong Kong PhD Fellowship Scheme (HKPFS) gradually build their research career at the Faculty, marching closer towards their scientific goals day after day. Let us hear their experiences and get some inspirations here.

DEPARTMENT OF CHEMISTRY

Great Teachers Lead the Way

TEO Qin Han

Recipient of HKPFS and HKU-PS

Year 2 PhD student from Department of Chemistry
Field of study: synthetic organic chemistry, focusing on making molecules with seven-membered rings
Place of origin: Malaysia
Supervisor: Professor Pauline CHIU, an expert in organic chemistry

As a kid, I was often fascinated by the reaction and interaction between chemicals, so I operated a tiny laboratory to do my silly experiments at home, which kindled my passion and interest in the realm of chemistry.

I am a firm believer in chemistry and think that its proper applications via technology in various fields such as medicine, agriculture, and food industry shall be the legacy we leave to our future generations. Being able to be a part of this process gives me a great sense of achievement and pride.

My research focuses on making molecules with 'seven-membered rings', one of the many kinds of bioactive natural structures that chemists have always been fascinated with and hope to synthesise them to serve as a lead compound for drug discovery and advance our understanding of the natural world. It is one of the many paths I am attempting to explore. In the long run, I hope my work will contribute back to society and help shape the world into a better place.

Nevertheless, research funding is always a challenge. Apart from financial aid provided by my scholarship, I am grateful that I also received extra funding to support my research, and the level of support is sufficient for buying items related to my thesis research, procurement of research materials, books, equipment, publication fees, and editing service.

The transition from undergraduate study to postgraduate research is also one of the bottlenecks. The most important fixed goal you can set during your undergraduate study is the date for your graduation. But as a postgraduate, your experimental plan could be changed anytime if the current one does not work. I manage to overcome it with the help of my supervisor and lab mates. I am grateful for the opportunity to work with my current supervisor, Professor Pauline CHIU, who always makes sure that I am on the right track and actively gives me feedback during our weekly meetings, which helps plan subsequent experiments and work. And thanks to my lab mates, who are from diverse backgrounds, eager to share different experiences with me all the time.

I also do my reflections and rethinking from time to time, which is an important process to lead myself and facilitate a more profound way of learning.

'Stay true, and persistence is the key!'

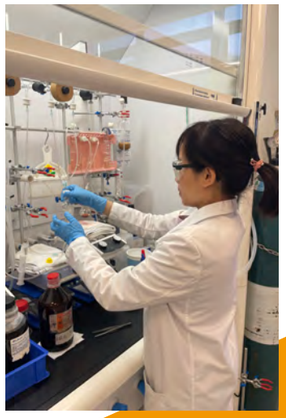
Benefits

The extra annual cash award cover half of my accommodation fees and some of the living expenses.

My lab mates are fun, considerate, caring and willing to help!

The chemistry between my supervisor and I is great!

Extra funding to support my research.



Tips to ace the scholarship interview

- Be authentic and be clear about your own direction.
- Don't be nervous when you meet the panels! Just imagine that you are having a casual talk with them.

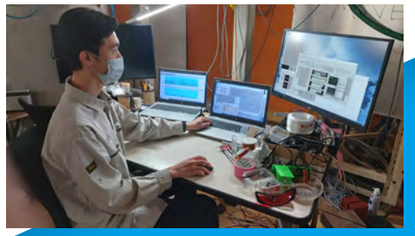
'Fostering self-initiative is important to excel as a researcher.'

I am given the opportunity to collaborate internationally.

The programme broadened my network to other scientific areas and enriched my student life.

HKPFS enabled my overseas research by removing a huge financial burden.

Benefits



Advice for prospective PhD students

- Be clear of your goals so that proper actions can then be taken to achieve them.
- Be aware of all the resources available to you as a student or researcher, as they will be of immense help.
- Although you will be given guidance as a student, you are meant to work independently on a research topic as a postgraduate student.

DEPARTMENT OF PHYSICS

Networking Opens New Doors

YAP Jinn Ming

Recipient of HKPFS and HKU-PS

Year 2 PhD student from Department of Physics
Field of study: nuclear physics, focusing on nuclear isotopes that are important in stellar processes
Place of origin: Malaysia
Supervisor: Dr Jenny LEE, nuclear physicist, and also recipient of 2021 NSFC Excellent Young Scientists Fund (Hong Kong & Macau)

I have always been curious of the fundamental workings of things around me. During my undergraduate study, I had a particular interest in the building blocks of our universe and especially found nuclear processes intriguing. I was also aware that a research career would allow me to explore the frontiers of the scientific domain, which led me to look for opportunities in nuclear physics to further my studies.

In the summer of 2019, I met my current supervisor, Dr Jenny LEE, in an undergraduate conference at HKU and eventually started my PhD career at HKU Science. Dr Lee has provided me with a lot of guidance and resources. Her sound knowledge and expertise in experimental nuclear physics are immensely helpful in guiding me through the research process in this domain. Dr Lee's ties within the international nuclear physics community have allowed me to collaborate with researchers worldwide. Her strong work ethic has also motivated me to follow in her footsteps to produce the best possible research work to my capabilities.

My research allows me to travel overseas since experimental research in nuclear physics requires extensive use of accelerators, which are only built in several places around the world. Since November 2021, I have been pursuing my research in the Institute of Physical and Chemical Research (RIKEN), Japan, one of the best facilities in the world for nuclear physics. The Radioactive Isotope Beam Factory (RIBF) at RIKEN has the most powerful accelerator for radioactive isotope production. Its capability allows us to study exotic nuclei that are both difficult to produce and elusive from measurements due to their short half-lives.

My current research is to perform mass measurement of exotic nuclei in the neutron-rich rare-earth region. I will also be working on the development of current state-of-the-art mass spectrograph devices to improve their efficiency and precision. The outcomes of my research will shed light on the formation and abundance of rare-earth elements during nucleosynthesis – the production of elements in the stars.

In the near future, I foresee myself continuing the path of research in nuclear physics, and perhaps even contribute to the successful development of fusion energy. This would require me to further my expertise in my current research and carve out a niche for myself. On the other hand, contemporary research is becoming more collaborative and I look forward to participating in such collaborations.

'Work hard and you will get your reward.'

My supervisor gave me valuable advice on developing my career.

The scholarship and financial aid helped me focus on my research better.

The travelling allowances enabled me to attend more overseas conferences, and even amidst this pandemic situation, I could still make it online and exchange ideas with intellectual researchers around the globe.

Benefits

General procedure to get your paper published

Most academic or peer-reviewed journals classify article submissions into at least three general categories: Accept, Revise & Resubmit, and Reject. Once you get rejected, you are not allowed to submit the same paper to the journal that rejected it ever again. The only chance to get it published is to revise it and submit to other journals. Revise & resubmit means the journal will give you the green light if you can address the comments from the reviewers.

Tips to ace your fellowship interview

- Prepare a good CV because the interviewers would not be able to know you well within a 15-minute interview.
- Make an all-out effort into your undergraduate study. Most importantly, get yourself strong recommendation letters from some reputable professors in your interested field.

DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE

Failure is Success in Progress

JIN Huaqing

Recipient of HKPFS and HKU-PS

Year 4 PhD student from Department of Statistics and Actuarial Science
Field of study: biostatistics, focusing on analysing of the medical data and clinical trials
Place of origin: Mainland China
Supervisor: Professor Guosheng YIN, an expert in biostatistics who made significant contributions to the frontiers of clinical trials. He was elected as a Fellow of the Institute of Mathematical Statistics (IMS) in 2021, one of the top honours for demonstrating distinction in research in statistics or probability.

When I came to our Department as a freshman, I had no idea which area of research to focus on. Thanks to my supervisor, Professor Guosheng YIN, who introduced me to the beauty of Bayesian statistics, which provides many powerful tools to analyse the datasets in practice.

There is an urgency to accelerate clinical trials while maintaining safety and efficacy for the development of new drugs and vaccine candidates during the pandemic. Under the guidance of Professor Yin, I am motivated to focus my research on medical data and clinical trials.

Our team has developed some new phase I and phase II clinical trial designs, which would help to speed up the development of the new drugs and vaccines. One of my papers has recently been accepted by a journal that developed a new calibration-free phase I/II design. I hope my methods will be widely applied in practice and be adopted in clinical trials by doctors one day. In this way, it will make my research work much more meaningful.

Every PhD student struggles to publish their first paper and I am no exception. My first project started in December 2018, three months after becoming a PhD student. However, when I was about to submit it to a conference six months later, I found that I had made some vital mistakes in the theoretic proofs of the paper. I must admit that there was a moment I almost broke down and wanted to give up.

Luckily, my supervisors Professor Yin and Dr Fei JIANG had been very patient with me. I managed to fix those mistakes with their help and submitted the paper on time. Nevertheless, the story did not end here. My paper got rejected, followed by some very harsh and critical comments – I got stumbled again!

Fortunately the misstep did not make me doubt myself. After repeated rejections and unsuccessful attempts, I did a substantial revision and had the paper submitted to a prestigious journal. Though I have never hoped of being able to make it, surprisingly I received good news from the journal after two months – I got the 'revise & resubmit' offer! The feedback from the reviewers was truly inspiring and I tried my very best to address their comments during those rounds of edits. Eventually, my paper got accepted in May 2021.

It took me two years to have my first paper published. This long journey made me realise that although the road of research is full of obstacles, you will still get the reward if you work hard to pursue your goal. I will finish my thesis in July 2022 and continue my research career as a postdoctoral fellow at the University of California, San Francisco. My adventure has just begun!

SCHOOL OF BIOLOGICAL SCIENCES

Clear Goals Pave the Way

Pauline DUFOUR

Recipient of HKPFS

Year 5 PhD student from School of Biological Sciences
Field of study: wildlife conservation, focusing on conservation physiology
Place of origin: France
Supervisor: Dr Timothy BONEBRAKE, an ecologist whose research interests lie in endangered species conservation, urban ecology, tropical biodiversity and global change

I have always loved animals; I just did not know how to make it my lifetime career. Interested in biology, I thought that I wanted to become a veterinarian, but after joining university, I realised what I truly liked was actually called 'ecology'.

During the pursuit of my master's degree in Paris, I started to be captivated by conservation physiology, an emerging field which offers a more dynamic approach in respect to climate change when compared to conventional conservation measures. The different research opportunities I had during that time played a big part in shaping my research direction and motivated me to do a PhD.

I have always loved forensic science as portrayed in fictions or dramas, but I had never connected it to a potential career in conservation, until early 2017 when I moved to Laos, regularly observing ostriches, monkeys, eagles, iguanas, or crocodile eggs in wildlife market – some of which are not even native species to Asia!

I embarked on my PhD journey during the same year, keeping wildlife trade research in the back of my head. My research is nested into a broad field of wildlife conservation, with a primary interest in conservation physiology.

I investigate the physiological responses of diurnal and nocturnal ectotherms to climate change, with a particular interest in lizards. Besides, I have also developed a project about the trade of tokay geckos, both for traditional medicine and pet trades.

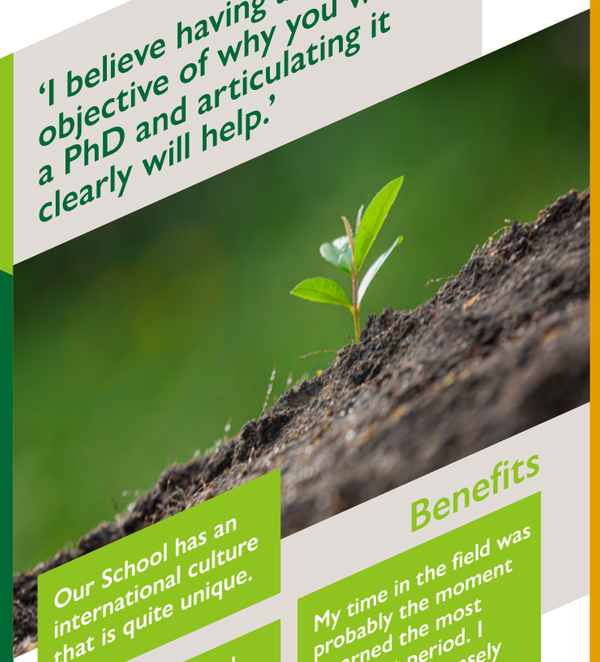
Being exposed to the Conservation Forensics Lab at the School of Biological Sciences, I developed interests and skills from many passionate ecologists, for which I am very grateful.

My supervisor, Dr Timothy BONEBRAKE, has played a crucial role in shaping the scientist I have become, by granting me his trust from the start and allowing me to develop my ideas at my own pace. I am very grateful for the opportunities and advice I received from him over the years, even during the most stressful parts of this journey.

I was also influenced by other scientists such as Dr Caroline DINGLE, the Director of the Conservation Forensics Lab. She always welcomed my questions, whether scientific or about student struggles. As the founder of the Women in Science at HKU, she also championed many of my peers and myself.

I would like to dig deeper into the topics I have based my research on, to address ecological and societal issues. The more I learn about the science of climate change, the more I see the need for societal change and human adaptations. I cannot imagine having a job that does not touch on these issues. I am looking forward to building my career on this expertise and experience, and to take part in creating a more informed, self-sufficient, and resilient society.

'I believe having a clear objective of why you want a PhD and articulating it clearly will help.'

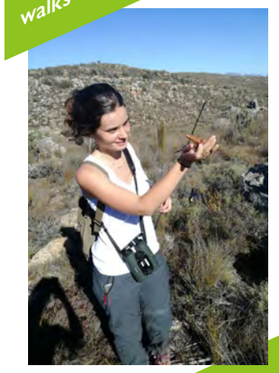


Our School has an international culture that is quite unique.

Joining international conferences allowed me to meet people beyond papers, including renowned researchers in my field. The whole experience was rewarding, even though it felt a bit overwhelming at times.

Benefits

My time in the field was probably the moment I learned the most in a short period. I benefited immensely from the experience and support of people I met, not only from researchers, but also from people from all walks of life.



Advice for prospective PhD students

Time management is definitely an issue for PhD studies. Students would need to review their progress and accomplishments from time to time, adjust their expectations and make back-up plans for their studies.

DEPARTMENT OF EARTH SCIENCES

Preparing for an Interdisciplinary Future

Anyang DING

Recipient of HKPFS and HKU-PS

Year 4 PhD student from Department of Earth Sciences
Field of study: biogeochemical cycling, focusing on iron cycling in Precambrian oceans and its interaction with the environment
Place of origin: Mainland China
Supervisors: Professor Guochun ZHAO (primary supervisor), a renowned geologist whose main research fields are metamorphic petrology, Precambrian geology and supercontinents, and was named by Clarivate Analytics as 2021 Highly Cited Researcher; Dr Sean CROWE and Dr Yiliang LI.

When I was a freshman, I became fascinated by the beauty of rocks and minerals, which led me to choose geology as my undergraduate major. As I explored deeper and deeper into the world of these essential building blocks of our planet, I found that geology is not merely a subject about understanding rocks but of studying the evolution of our 4.5 billion-year-old Earth. I therefore became more open-minded in different research fields and questions, and got interested in the interplay between early life and the environment. To satisfy my thirst for learning and exploring the unknown, I decided to go on to graduate study and dive into the world of geosciences.

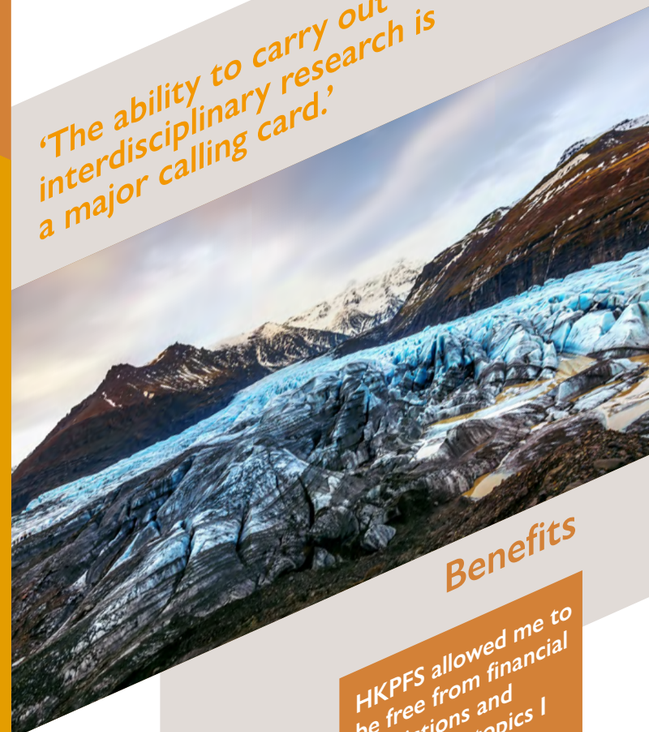
It is very challenging to verify or validate the scientific findings in the area of Earth Sciences, as the geological record has been altered or does not even exist anymore. The best we can do is to provide as much evidence and support as possible to back up our interpretation of the observation.

Recently, I have published a paper in *Communications Earth & Environment* with my supervisor Dr Yiliang LI and our collaborator on solar cycles on the early Earth. To argue the presence of solar cycles and their influence on climate was probably 2,470 million years ago, we reviewed previous studies on the dynamos of main-sequence stars, solar-activity-climate interaction, and microbial ecophysiology in ferruginous water bodies. Dr Li guided me through the whole process, from data analysis to manuscript proofing. He is always there to listen, help, and offer guidance. We have had numerous inspiring conversations – it is he who gave me the confidence to explore any topics that interested me.

As a graduand in the Class of 2023, I am fully aware of the highly competitive job market in the academia. To cope with this, the ability to carry out interdisciplinary research projects is a major calling card. Therefore, I am currently doing research on both environmental elemental cycling (by running simulation) and microbial activity (by lab work), and I also equipped myself by learning versatile research techniques, including computer simulation and microbial culturing, hoping that enhancing interdisciplinary research skills may benefit my future research path.

At this point, I have been trying my best to address small questions, as I believe this will eventually help the scientific community solve the big questions collectively.

'The ability to carry out interdisciplinary research is a major calling card.'



Benefits

HKPFS allowed me to be free from financial restrictions and choose any topics I desire to focus on.

Photo courtesy of Shuhan & Wenjun

Advice for prospective PhD students

- Being anxious about the future will only make your life miserable. So focus on the present moment instead of dwelling on regrets or worries.
- Doing nothing will build up anxiety very fast, so always do something related to your research.

'Explore as many research fields as you can during undergraduate study to help you identify your true research interests.'

The scholar programme has transformed my life. I most appreciate the financial support and the extra research opportunities it offers.

Additional training in effective science communication will help me to succeed in grant applications in the future, which is crucial for my research career.

Benefits

Participating in international conferences allowed me to exchange ideas with researchers from other countries.

Advice for prospective PhD students

- Being patient is an essential quality of a successful researcher.
- It would be best if you volunteer to work in different laboratories during your undergraduate study, as it will give you an understanding of what it is like to work in a research setting.
- Volunteering is the best way to find your ideal supervisor as well.
- Do not limit yourself to your current major. Explore as many research fields as possible because it will help you identify your true research interests.

SCHOOL OF BIOLOGICAL SCIENCES

Early Research Experiences Fuel Interest in Science

Elsie Chit Yu IU

Recipient of HKU-PS

Year 1 PhD student from School of Biological Sciences
Field of study: metabolism, focusing on the metabolic adaptation of the skeletal muscle
Place of origin: Hong Kong
Supervisor: Dr Chi Bun CHAN, an expert in energy metabolism, whose research interests lie in physiological regulation and pathological alternation.

Like many of my undergraduate fellows, I hardly knew what scientific research was like as a freshman, but I was deeply impressed by the enthusiasm of researchers and their commitment to lifelong learning, which led me to take the initiative and volunteer as a student helper in the laboratory led by Dr Mingfu WANG, whose research focuses on anti-cancer effects of phytochemicals.

My first research experience was very educative. I learned to integrate various experimental techniques in chemical compound analysis, better understand the cell culture process, and was given a chance to perform animal experiments. Besides teaching me an array of techniques, Dr Wang also shared his research experience along the way, and showed me how to run a research laboratory, giving me an idea of what to expect in my scientific career.

After having a taste of scientific research, I was admitted to the Summer Research Fellowship (SRF) Scheme. I was given a chance to conduct an individual research project in Professor Nagendra Prasad SHAH's laboratory. Under his supervision, I discovered that using germinated wheat flour instead of regular one produced bread with significantly higher GABA content, unleashing the potential to make anti-hypertensive staple food.

Firing up by these experiences, I even extended my undergraduate study by enrolling in the final year research project (FYP), which trained me to be a logical thinker, thus preparing me for my independent postgraduate research.

Thanks to my current supervisor Dr Chi Bun CHAN, who was my teacher in an undergraduate course about endocrinology, he inspired me to explore the field of metabolism and motivated me to embark on the research journey.

It has been seven months since I joined the PhD programme, and I fully enjoy the moment. Dr Chan's research group creates a very comfortable and friendly atmosphere for newcomers, and I am instantly connected and developed a sense of belonging in the lab. Dr Chan is the kind of mentor who always initiates thought-provoking conversations that stimulate me to seek answers on my own rather than spoon-feed me information. Being around him is like having a supportive friend who always offers comfort and guidance to help me overcome adversity. Besides, I am still dazzled all the time by his logical intelligence!

My ultimate research goal is to unveil the interorgan crosstalk in fatty acid metabolism, which plays an important role in the progression of metabolic myopathy, hepatopathy, and adiposopathy. With the help of collaborators in the chemical and clinical fields, my team could develop novel treatments for these currently incurable diseases and validate the results of the animal model in human clinical studies.

DEPARTMENT OF MATHEMATICS

Get to the Bottom of Problems by Asking a Lot of Questions

Aneesh JATAR

Recipient of HKU-PS

Year 1 PhD student from Department of Mathematics
Field of study: complex analysis
Place of origin: Hong Kong
Supervisor: Professor Tuen Wai NG, whose research areas closely align with complex analysis, in particular, geometric function theory and invariant metrics, complex differential and functional equations, the geometry of polynomials, factorisations and iterations of meromorphic functions.

As a child, mathematics was like an anxiety-inducing chore to me. At some point in my early teens, I realised much of my phobia I had for the subject was actually attributed by my incomprehension of it – I did not understand why and what I was doing when facing homework problems. In this sense, the dread was inevitable.

Somehow, rote learning and the lack of understanding how these mathematics formulae work prevented me from tweaking them to solve equations in the necessary way.

So I took it upon myself to probe on my shaky foundation in all ways I could, essentially asking 'why' repeatedly like a five-year-old child until I got to the bottom of it. Likely, after a very long time, and with the aid of the Internet and some old textbooks, things began to click for me in a way they never had before.

Thanks to an excellent Mathematics teacher I had in high school, my peers and I were exposed to nonstandard ways of approaching problems under his tutelage which inspired me to look beyond 'school Mathematics' and think about the possibility of pursuing 'doing Mathematics' as my career.

Being encouraged by him, I enrolled on a university course opened to high school students. The style of thinking the course promoted was exciting. Although it had a huge learning curve and left me with more questions than answers, I was pretty much obsessed with trying to answer them from then on. This led me to continue learning Mathematics at university and eventually led me to the path of postgraduate study.

I have just embarked on my first year of PhD study, and the experience of working with my research group has been very rewarding and encouraging so far. My supervisor Professor Tuen Wai NG has provided me with ample support both personally and professionally, and the questions being prompted by him and my group during presentations and discussion are invaluable to me, as they serve to point out errors in my thinking, as well as deepen my understanding of my studies. Most importantly, outside of academic matters, my family has been incredibly supportive of me.

I think it is too early to say about my future career pathway. Still, I am excited at the prospect of continuing to conduct research in mathematics and teaching the subject in some form, whether that be through staying in academia or otherwise.

'Do not be afraid to ask questions, even if they are elementary.'

Stipend and Support for the Most Talented Research Elites

HKU Presidental PhD Scholarship (HKU-PS)

As a part of the HKU Presidential PhD Scholar Programme, a prestigious scholarship package, namely, the HKU Presidential PhD Scholarship, is offered to attract top candidates from around the world to pursue full-time PhD studies at HKU.

The HKU Presidential PhD Scholars will receive strong academic and training support from the University, e.g. individualised advisory service, training in teaching, chances to rotate among different research labs/disciplines, and more opportunities to interact with leading scholars. A group of distinguished Faculty members will also give advice, provide additional mentorship and training opportunities, and oversee the academic career paths.

Hong Kong PhD Fellowship Scheme (HKPFS)

Established in 2009 by the Research Grants Council (RGC), the Hong Kong PhD Fellowship Scheme (HKPFS) aims at attracting the best and brightest students in the world to pursue their PhD programmes in Hong Kong's universities.

Those who are seeking admission as new full time PhD students in Hong Kong universities funded by the University Grants Committee (UGC), irrespective of their country of origin, prior work experience and ethnic background, should be eligible to apply. Applicants should demonstrate outstanding qualities of academic performance, research ability/potential, communication and interpersonal skills, and leadership abilities.

In HKU, the package of recipients of HKPFS will be automatically upgraded to an HKU-PS one.

A generous package for recepients of HKU-PS and HKPFS:

- **Cash award to support research & living expenses**
  HK$40,000 in Year 1; HK$20,000/year for the remaining normative study period
- **Conference & research-related travel allowance**
  of HK$13,300/year
- **Postgraduate scholarship (PGS)**
  of HK$26,600/month
- **Waiver of tuition fees**
  for the whole normative study period (i.e. HK$42,100/year)
- **Guaranteed accommodation in year 1**
  Hall place guaranteed in Year 1, with possibility of renewal in Year 2
- **Additional support from HKU Science**
  The Faculty's Doctoral Entrance Award of HK$15,000 in Year 1

For more details,
please visit: https://bit.ly/3JjAwY5

Photo credit: Insect Biodiversity and Biogeography Laboratory

BIOLOGICAL SCIENCES

Ants as Indicator Species of Effects on Environmental Conditions

Researcher // **Dr Benoit GUÉNARD**,
Associate Professor of School of Biological Sciences

Our Ecologists have been studying long-term changes in species richness and composition of ants at 47 sites in country parks across a period of over 20 years of forest regeneration in Hong Kong. The results highlight the importance of secondary forests in buffering temperature impacts on subtropical ants.

我們的生態學家追蹤了 47 個本港郊野公園內的螞蟻群落在過去 20 多年森林再生過程中的變化，研究其品種數量及組成。結果揭示再生的次生林可減輕酷熱天氣對物種所帶來的負面影響。

Learn more: https://bit.ly/3GwKiom

THE SCIENCE BEHIND

Ants tend to build nests and to stay in one place. Therefore, studying ants is particularly interesting to understand how habitat modifications and changes in climates may impact local biodiversity.

蟻巢不會隨便遷移，因此是良好的生物指標，可幫助研究棲息地的轉變和氣候變化會如何對生物多樣性構成影響。

In this study, the authors accessed and re-identified specimens collected in the 1990s. This allowed for consistency in the species identity between the two periods and a detailed account for taxonomic updates and changes over time.

這項研究利用 90 年代採集的螞蟻標本作為基線參考。

THE SCIENCE BEHIND

Photo credit: Stefano Cannicci

A high functional redundancy is a sort of 'ecological insurance' for a given ecosystem since if one species is lost, another can fulfil its function, ultimately keeping the ecosystem viable.

低功能冗餘度指當一物種消失，可作替代、發揮相似功能的物種不多，令生態環境在氣候或人為變化下備受更大的威脅。

Photo credit: Stefano Cannicci

Invertebrates are crucial for mangrove nutrient cycling and oxygen provision to tree roots; these functions will be lost with a decrease in functional diversity.

無脊椎動物與紅樹林的許多生態功能都息息相關，當中包括養分的循環及為樹根提供氧氣等等；低功能冗餘度會導致一些功能缺失而影響生態健康。

Photo credit: Stefano Cannicci

THE SWIRE INSTITUTE OF MARINE SCIENCE

Mangroves Are Under Threat Because Their Species Play Too Unique Ecological Roles

Researcher // **Dr Stefano CANNICCI**, Associate Professor of School of Biological Sciences and Associate Director of the Swire Institute of Marine Science
Collaborator // School of Life Sciences of The Chinese University of Hong Kong

Our Marine Ecologist compiled a dataset of invertebrates including 209 crustacean and 155 mollusc species from 16 mangrove forests around the world and found that mangroves, when compared with other ecosystems, have the lowest functional redundancy of invertebrates, which suggests that these coastal vegetations are one of the most precarious ecosystems in the world in face of recent anthropogenic changes.

港大海洋生態學家及其研究夥伴，集合了來自全球 16 個紅樹林的數據，當中記錄了 209 種甲殼動物和 155 種軟體動物的資料，發現在紅樹林內棲息的動物之功能冗餘度很低，說明其在人為的環境變化下備受更大的威脅。

Learn more: https://bit.ly/35UU2w5

EARTH SCIENCES

Was Gale Crater on Mars Really a Lake? Planetary Geologists Said It was More Like a Small Pond

Researchers // **Dr Jiacheng LIU**, and his supervisor
Dr Joseph MICHALSKI, Associate Professor of Department of Earth Sciences

The Gale crater on Mars was thought by many scientists to be the site of an ancient lake on Mars more than 3 billion years ago. But with the use of chemistry measurements and X-ray diffraction (XRD) measurements from Nasa's Curiosity Mars rover, in addition to images of rock textures, our geologists conclude that the compositional trends in the rocks actually relate to weathering processes rather than formation in an aqueous lake environment.

不少科學家認定火星的蓋爾隕石坑為一個 30 億年前形成的湖泊所在地；我們的研究團隊卻提出不同的論點。團隊利用火星車「好奇號」上的化學和礦物探測儀器獲取的數據，結合岩石結構的照片，來揭示這些岩石實為風成沉積物而非湖相沉積物。

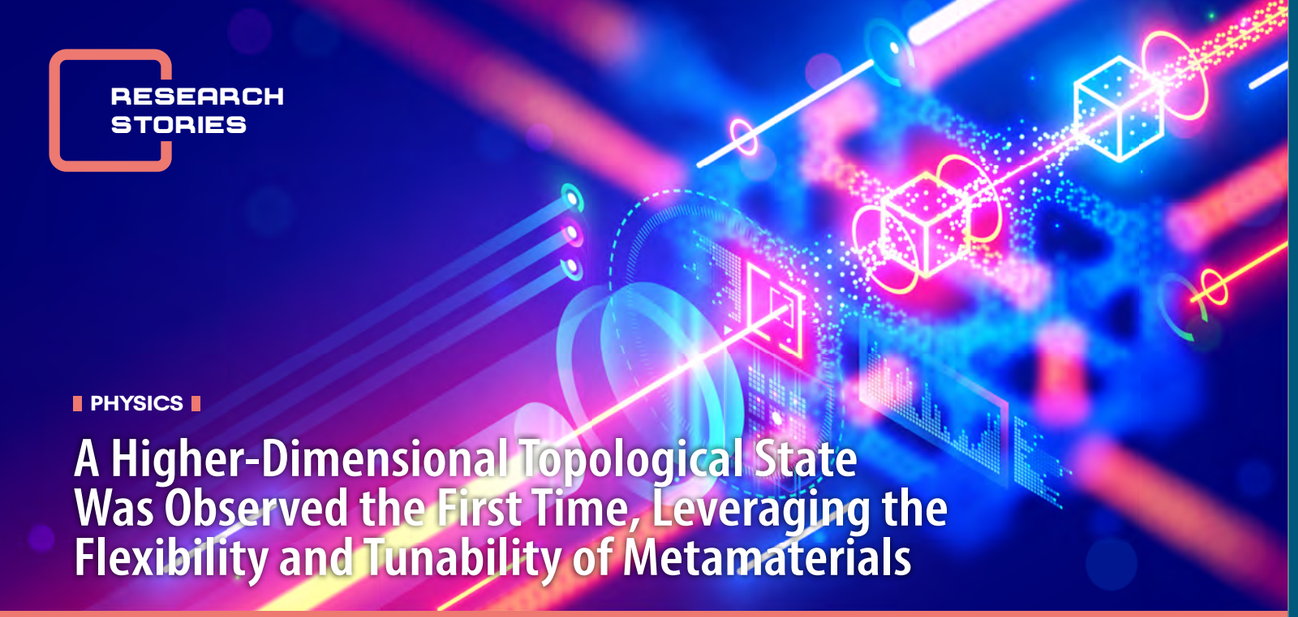
THE SCIENCE BEHIND

Image credit: ESA/HRSC/DLR

這些圖像由好奇號火星車上的 THEMIS 熱輻射成像系統拍攝，圖中為蓋爾隕石坑，藍色代表湖泊。左圖顯示的是經典模型所假設、存在於蓋爾隕石坑的深湖。右圖是我們的研究團隊提出的模型，其中僅在蓋爾隕石坑最底部存在較小範圍的淺湖。

These images show Gale crater in High Resolution Stereo Camera (HRSC) images, with elevation colorised in blue. The image on the left shows the standard model where Gale crater is generally assumed to have been a large lake (flooded to at least an elevation of ~4,000m). The image on the right is the model proposed by Liu et al., in which only very small, shallow lakes existed on the floor of Gale crater.

Learn more about the research: https://bit.ly/3rviUmd



PHYSICS

A Higher-Dimensional Topological State Was Observed the First Time, Leveraging the Flexibility and Tunability of Metamaterials

Researcher // **Professor Shuang ZHANG**, Chair Professor of Department of Physics
Collaborators: Jilin University, The Hong Kong University of Science and Technology and Tsinghua University

The team and their collaborators experimentally observed 'Linked Weyl surfaces', a novel type of topological phase that exists in five-dimensional space for the first time.

This work provides a unique platform for exploring various topological phases, the transition between them, and the corresponding boundary effects in five dimensions.

我們的團隊首次通過實驗觀測到互相纏繞的外爾表面（Linked Weyl surfaces），一種存在於五維空間中的新型拓撲相。這個工作為研究五維物理體系的各種拓撲相、它們之間的轉變，以及與之對應的表面態效應提供了一個獨特的平台。

Learn more about the research: https://bit.ly/3ozbbSi

THE SCIENCE BEHIND

Topological physics holds promise for novel devices and applications in electronics and photonics, such as large-scale topological quantum computation and topological laser.

拓撲物理學為設計和應用電子學和光子學中的新型器件帶來契機，可成就大規模拓撲量子計算和拓撲激光器等高端技術。

The findings leverage the concept of higher-dimension topology, which can possibly control the propagation of electromagnetic waves in artificially engineered photonic media, such as realising robust integrated photonic circuits for optical information processing that is immune to scattering loss.

設計新型器件，例如在人工設計的電磁結構裏控制電磁波的傳播，亦可以實現不受散射損耗影響的單向拓撲態的集成光路，並可應用於處理光信息。

CHEMISTRY

Boosting Up Solar Panel Efficiency: Our Theoretical Chemist Discovered a High-Efficient Energy Transfer Pathway

Researchers // **Mr Rajat WALIA**, PhD student, **Dr Zexiang DENG**, Postdoc Fellow, and their supervisor **Dr Jun YANG**, Assistant Professor of Department of Chemistry

Our research team developed an extensive and widely applicable computational technique using high-level quantum chemistry algorithms to reveal complex electron and energy transfer pathways in photophysical processes. Their findings would promote the optimisation of the performance of photofunctional materials and enhanced solar panel efficiency.

理論化學團隊運用了高精度量子化學演算法，開闢了光活性材料裏的電子及能量轉移通道，可提高其能量轉換效率；此發現有助生產更高效的太陽能電池板。

Learn more about the research:
https://bit.ly/3LdKYmh

We all know that light consists of photons. In traditional photofunctional materials, when solar cells convert light into electricity, only one electron can be excited by one photon, and solar cell efficiency is intrinsically capped by Shockley-Queisser limit – only about 33% of the total incident sunlight can be harvested and converted due to spectrum losses.

光由光粒子所組成；而在傳統上，光電效應中每一粒電子只會吸收一粒光子的能量，加上傳統太陽能電池的能量轉換效率受到 Shockley-Queisser 熱力學極限的限制（物理性質的約束），在正常的陽光條件下，其轉換效率最高為 33%。

The theoretical work by our research team has discovered that the efficiency limit can be removed by incorporating novel quantum channels of electron-hole pair duplication. As a result, the exciton generation is boosted at the expense of only one photon energy to double electric currents in solar cells, which holds a great potential to substantially improve the light-electricity conversion efficiency.

我們的團隊通過理論計算，發現了新型光伏量子通道，突破了傳統光物理過程的限制，將材料吸收的一份光子能量複製為兩份電子空穴對。理論上光子 - 激子轉換效率會因此翻倍， 從而提高光電轉換效率。

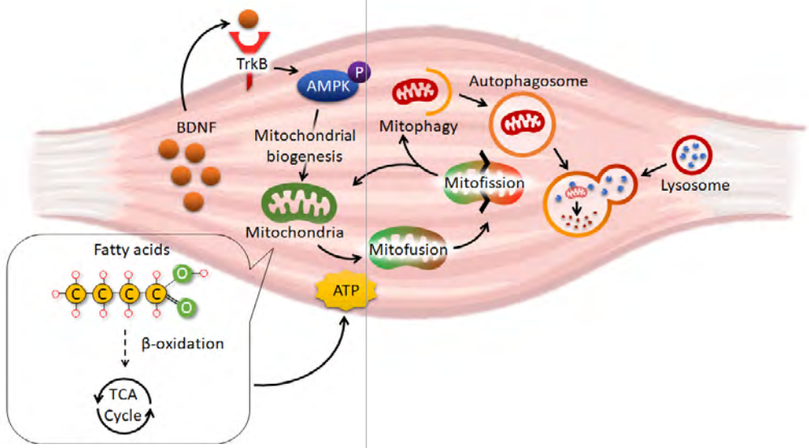
THE SCIENCE BEHIND

BIOLOGICAL SCIENCES

Our Biologist Discovered an Obesity-Control Protein From a Mouse Model

Researcher // **Dr Chi Bun CHAN**, Assistant Professor of School of Biological Sciences

A special obesified mouse model is developed by removing the gene of brain-derived neurotrophic factor (BDNF) exclusively in their skeletal muscle. The team found that the mice without BDNF in their muscle gained more body weight and developed severer insulin resistance when fed with a high-fat diet, concluded that muscle-derived BDNF is a weight-control protein by increasing the energy expenditure and maintaining insulin sensitivity.



團隊通過基因改造的方法剔除小鼠肌肉中的「腦源性神經營養因子（BDNF）」，發現小鼠進行高脂飲食後不但增重，還出現了嚴重的胰島素阻抗，其能量消耗也低於正常的小鼠，證明 BDNF 是一種可控制體重和維持胰島素敏感度的重要蛋白。

Learn more about the research:
https://bit.ly/3owp3Nj

STATISTICS AND ACTUARIAL SCIENCE

‘Deep Learning’ Tips From AI System: Should Know When to Stop!

Researchers // PhD student **Mr Xuran MENG** of Department of Statistics and Actuarial Science and his supervisor **Professor Jeff YAO**

Why are the AI systems empowered by Deep Learning so successful? Our researchers dug into many existing real-world deep networks and found that an efficient ‘early stopping criterion’ in Deep Learning significantly improves the quality of the deep networks, meaning AI knows when to stop to avoid overtraining.

以深度學習為基礎的人工智慧系統，在過去十年中取得了驚人的進步，到底其成功之道是甚麼？我們的研究團隊對現有的深度網絡作出分析，發現深度學習中的「早停準則」，即「學夠了便停」，防止過度學習的模式能顯著提高學習質量。

Learn more: https://bit.ly/3GEb6TH

THE SCIENCE BEHIND

Large weight matrices determine the connections between different layers of a deep neural network in deep learning.

矩陣（Matrices）是人工智能系統的數學基礎，因此分析矩陣可理解深度網絡在不同層面的「思路」。

The research team used the modern theory of random matrices to observe and explain the evolution of the weight matrices and anaylsed their learning behaviour.

團隊運用現代隨機矩陣理論來觀察和解釋深度網路裏的矩陣在不同層面之間的演變，以了解深度學習的的模式。

MATHEMATICS

Mathematicians Aim to Construct Trustworthy Surrogate Models by Combining Multiscale Concepts With Deep Learning Methodologies

Researcher // **Dr Yating WANG** of Department of Mathematics Collaborators // University of California, Irvine and Purdue University, US

Many complex physical phenomena can be described by partial differential equations with multiscale parameters. However, numerical simulations for nonlinear equations with stochastic multiscale coefficients are challenging and time-consuming because of the heavy simulation burden. The team proposed an adaptive sparse learning algorithm that can be applied to learn the dynamical systems of flow and transport processes. The work shows that the sparsity patterns of the network output are potentially interpretable in some applications.

運用多尺度參數的偏微分方程可將許多複雜的物理現象準確描述，可是當中卻牽涉大量的數值計算，令解開這類問題變得相當困難。研究團隊合作提出了一個具靈活性的稀疏學習算法來模擬流體擴散的過程。結果顯示，在一些應用中，該神經網絡輸出的解稀疏形式具有可解釋性。

The sparse learning algorithm can discover a small active set of bases and select important degrees of freedom from a large snapshot space for the quantities of interest.

稀疏學習算法可從大規模的快照空間中動態地辨認一個基函數子集，並選取出較重要的程式自由度。

The trained neural network resulted from the sparse learning algorithm will be utilised as a reduced-order multiscale model, thus can significantly reduce computational costs.

將稀疏學習所訓練的神經網絡用作降階的多尺度模型，可減少計算成本。

THE SCIENCE BEHIND

External Awards and Honours

Professor Vivian Wing-Wah YAM

Professor Vivian Wing-Wah YAM, Dean of Science (Interim) and Philip Wong Wilson Wong Professor in Chemistry and Energy, was elected by the General Assembly of The International Organization for Chemical Sciences in Development (IOCD) as its new President.

She was also selected as one of the three prominent scientists in the inaugural ‘Pioneers in Energy Research’ (PIERs) programme by Energy & Fuels of American Chemical Society (ACS) Publications. She was honoured in the field of solar energy and conversion of light for her outstanding contribution to the area of novel excited states for organic light-emitting materials/devices and solar energy conversion.

Professor Hongzhe SUN

Professor Hongzhe SUN, Norman and Cecilia Yip Professor in Bioinorganic Chemistry and Chair of Chemistry, was awarded the 2021 'Chinese Association for Instrumental Analysis (CAIA) Award' (Grand Prize) for his pioneering work ‘Metallomics, metalloproteomics and its application in human health’ and in recognition of his exceptional accomplishments in research.

Dr HE Jian

Dr HE Jian, Assistant Professor at the Department of Chemistry and State Key Laboratory of Synthetic Chemistry, was presented with the Innovation Award 2021 by the Croucher Foundation to recognise his excellent scientific research achievements.

Professor Guochun ZHAO

Professor Xiaoming YUAN

Professor Min SUN

Professors Guochun ZHAO and **Min SUN** from Department of Earth Sciences, **Professor Xiaoming YUAN** from Department of Mathematics, as well as **Professors Shuang ZHANG** and **Wang YAO** from Department of Physics, were named by Clarivate Analytics as ‘2021 Highly Cited Researchers’ – the most influential scholars in the world. Highly Cited Researchers are selected for their exceptional research performance, determined by production of multiple highly cited papers that rank in the top 1% by citations for field and year in Web of Science.

Professor Shuang ZHANG

Professor YAO Wang from Department of Physics was also awarded The 2021 (the Ninth) Nishina Asia Award for his pioneering contributions to valleytronics in two-dimensional semiconductors and van der Waals heterostructures.

Professor Wang YAO

HKU Science’s Innovative Research Project Triumphed at Special Edition 2022 Inventions Geneva Evaluation Days

The first 3D-printed terracotta ‘reef tiles’ co-developed by The Swire Institute of Marine Science (SWIMS), HKU Science and Faculty of Architecture was awarded a Gold Medal in one of the most prestigious innovation exhibitions ‘the International Exhibition of Inventions of Geneva (IEIG)’.

Making use of robotic 3D printing technology and environmentally-friendly terracotta materials, the team developed a structurally complex foundation for coral attachment and to prevent sedimentation, one of the major threats to corals.

Internal Awards and Honours

Three Faculty members received awards under the HKU Outstanding Researcher Awards Scheme 2020-21. In which, **Professor Guochun ZHAO** from Department of Earth Sciences was awarded the highest honour ‘Distinguished Research Achievement Award’ for his exceptional contributions in his research in Precambrian geology, metamorphic geology and supercontinents in Earth’s history.

Besides, **Dr Zhiwen ZHANG** from Department of Mathematics and **Dr Alex WEBB** from Department of Earth Sciences were awarded the Outstanding Young Researcher Award and Research Output Prize–Faculty of Science, respectively.

Professor Guochun ZHAO

Dr Zhiwen ZHANG

Dr Alex WEBB

NEW STAFF

Dr Kai HAN

Assistant Professor of Department of Statistics & Actuarial Science

Research interests: computer vision, deep learning, machine learning

“ I am excited to join the Faculty of Science and become a member of the Department. My interests centre around computer vision and deep learning. The broad goal of my research is to achieve principled and comprehensive visual understanding for real applications of artificial intelligent systems. Outside of work, I enjoy travelling, swimming, and the outdoors. I am looking forward to working with my new colleagues and students at HKU! ”

Dr Alice C HUGHES

Associate Professor of School of Biological Sciences

Research interests: conservation biology, One Health, species ecophysiology and distribution

“ It is truly a pleasure to join the HKU Science family! My research broadly has two major different themes. One is on conservation approaches which explore how threats impact on biodiversity at regional and global scales and tries to develop more pragmatic solutions to maintaining biodiversity. The other main strand of my research has focused more heavily on bats, whilst I have worked on for over 15 years, largely focusing on regional ecology.

My work aims to span the gap between conservation science and conservation action. I analyse effective targets to be developed, which can stem global and regional drivers of diversity loss, and maximise the synergy between climate goals and ecosystem service provision. ”

Dr Heath JOHNSON

Assistant Professor of School of Biological Sciences

Research interests: cell signalling, developmental biology, optogenetics, synthetic biology

“ Working at HKU is the fulfilment of two dreams I had simultaneously – having my own lab at a great school, and living abroad in one of my favourite cities. My lab will focus on understanding how signalling pathways can be used to encode instructions for cells and developing optogenetic tools and biosensors to manipulate and measure these pathways.

Beyond science, I am passionate about food, the outdoors, travel, and video games. Thus, I cannot wait to explore all the food and hiking options here in the city. I look forward to sharing good ideas and food with the faculties and students here! ”

Dr Eduardo MAEDA

Assistant Professor of School of Biological Sciences

Research interests: remote sensing, terrestrial ecosystem dynamics, microclimate, land use change

“ After spending more than 10 years working in Finland, I am very excited to join the School of Biological Sciences at HKU. My research applies geospatial technologies, such as remote sensing, to understand fundamental patterns in the terrestrial ecosystem dynamics, as well as how humans are affecting natural ecosystems. In my free time, I like to practise Brazilian Jiu-Jitsu, and to spend time with family and friends. I am looking forward to working together with the extremely talented Faculty members of HKU. ”

Dr Kin Sum LEUNG

Assistant Lecturer of School of Biological Sciences

Teaching areas: food and health, analytical methods for food quality, food processing and food technology

“ I am delighted that I can contribute back to my alma mater where I completed both my undergraduate and PhD. Food Science has always been my interest as the close-to-daily-life, multidisciplinary area includes food safety, health and nutrition, food security, etc. I am interested in studying the methods of measuring different components in food, studying their interactions during food processing and storage, and elucidating the effects of food nutrients after consumption. I hope my lectures can help students understand the principles and inspire them to explore more. ”

Dr Kenneth K H NG

Lecturer of Department of Chemistry

Teaching areas: chemical biology, synthetic chemistry

“ I read Natural Sciences during my undergraduate at the University of Cambridge and followed on to pursue a PhD in Organic Chemistry. After spending ten years in the UK, I returned to my hometown to join HKU, diving into the field of Chemical Biology and focusing my research on the modulation of innate immunity. Over the years in HKU, it made me feel all positive about devoting my full attention to becoming a mentor, a confidant and a friend to our undergraduates – and here I am now! Besides being a lecturer, I am also a father of two. ”

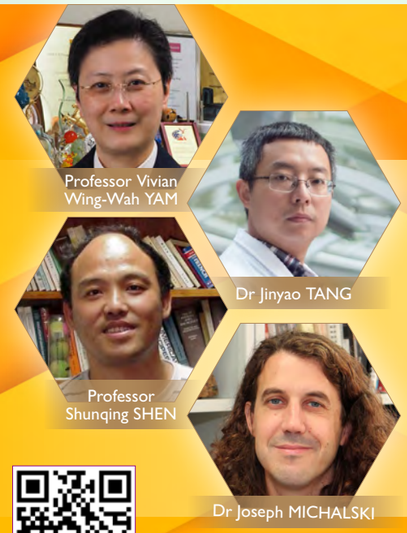
Dr Mathew SEYMOUR

Assistant Professor of School of Biological Sciences

Research interests: environmental DNA (eDNA), biodiversity spatial and temporal dynamics, biomonitoring, aquatic environments

“ Originally from the USA, I did my undergraduate in Wyoming, my Masters in Iceland, PhD in Switzerland and held postdoctoral positions in the UK and Sweden. I am excited to finally join HKU at the SBS. My research focuses on understanding the processes and mechanisms that shape biodiversity patterns. With recent advancements in molecular and analytical methodologies, I have expanded my research to utilise eDNA to facilitate biodiversity research while also looking to further our understanding of eDNA itself and how we can best utilise it for wider scientific research. ”

FUNDING



Faculty of Science Scoops Four Awards in 2021/22 Collaborative Research Fund (CRF) Group Research Projects

Professor Vivian Wing-Wah YAM and Dr Jinyao TANG from Department of Chemistry, Professor Shunqing SHEN from Department of Physics, as well as Dr Joseph MICHALSKI from Department of Earth Sciences, secured a funding of over HK$24.8 million from the Research Grants Council (RGC) 2021/22 funding exercise under the Collaborative Research Fund (CRF). Their success is a clear demonstration of the research competitiveness of the Faculty.

Learn more:
https://bit.ly/3jdcdQZ

Scientists Awarded Environmental and Conservation Fund to Explore Green Solutions

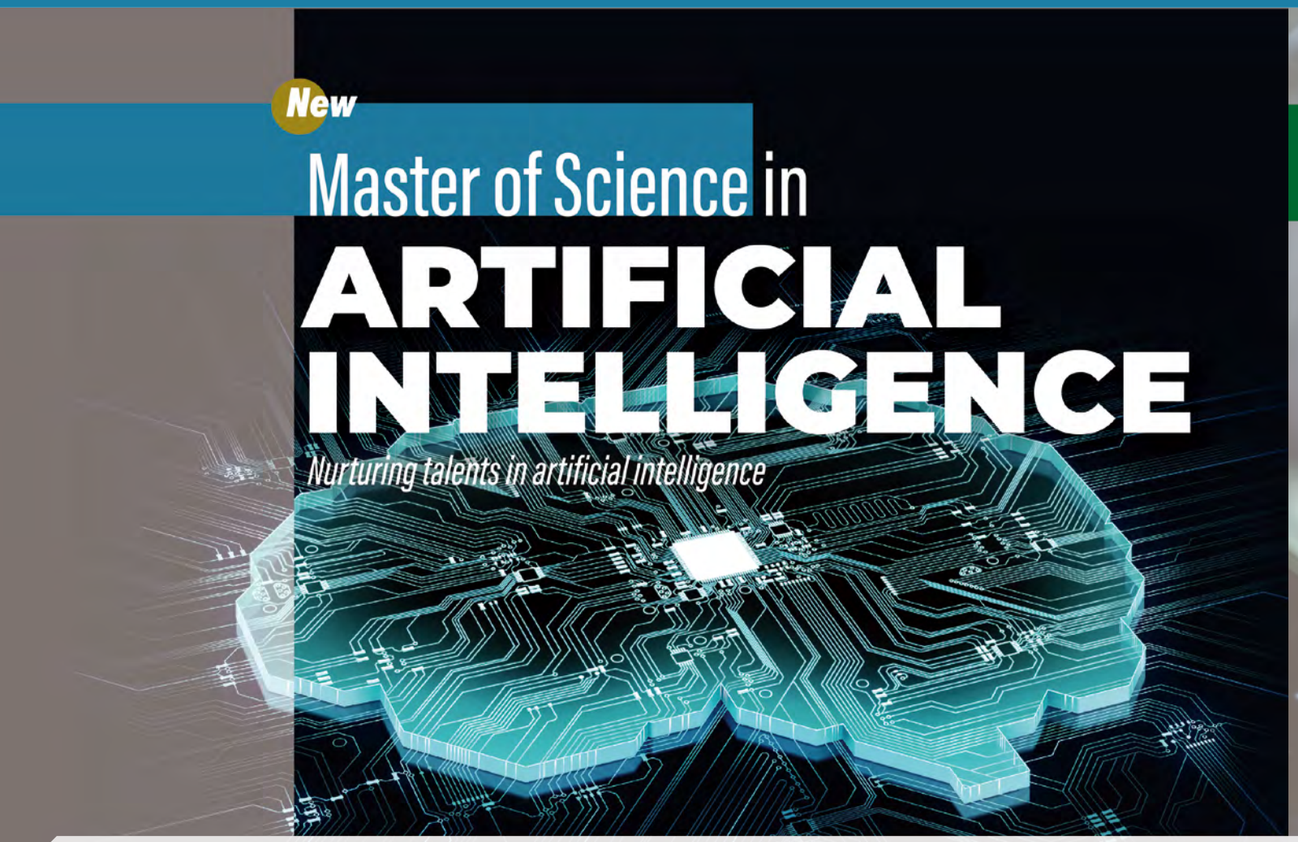
Dr Louise Amy ASHTON and Dr Simon Yung Wa SIN from School of Biological Sciences, Professor Aleksandra DJURIŠIĆ from Department of Physics, as well as Professor Zheng Xiao GUO and Dr Ho Yu AU YEUNG from Department of Chemistry, secured HK$5.4 million from the Environmental and Conservation Fund (ECF) of the HKSAR Government, under the funding scheme ‘Environmental Research, Technology Demonstration and Conference Project 2021’, paving ways to explore effective means to protect the environment and natural resources.

Learn more: https://bit.ly/36YNw8o

TEACHING

New Taught Postgraduate Programmes
Cultivating the Next Generation of High-Tech Scientists

To meet emerging needs of society and cultivate students who want to enhance their competitiveness in the high-tech industry, the Faculty of Science will launch two new taught postgraduate programmes, Master of Science in Artificial Intelligence and Master of Science in the field of Physics in the academic year 2022-23, providing students with a solid foundation to enter the two highly multi-disciplinary fields with promising employment opportunities.



New

Master of Science in
ARTIFICIAL INTELLIGENCE

Nurturing talents in artificial intelligence

The Master of Science in Artificial Intelligence is an interdisciplinary taught postgraduate programme jointly offered by the Department of Mathematics (host), the Department of Statistics & Actuarial Science and the Department of Computer Science. Its academic focus is promoting the applications of mathematics, statistics and computer science to facilitate AI in decision-making and problem-solving for various organisations and enterprises within the private and public sectors.

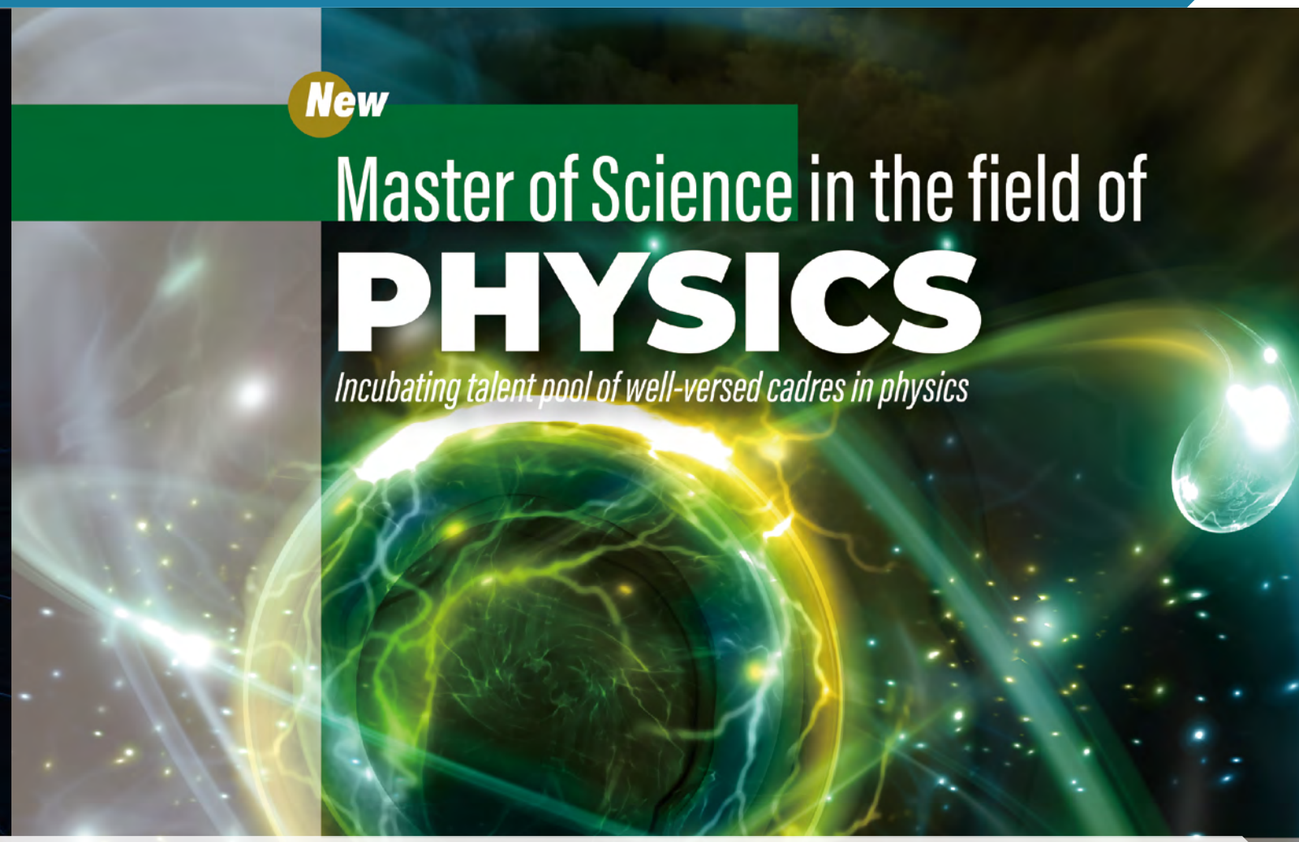
Host
Department of Mathematics

Programme Features

1.5-year-full-time programme, offering fast-track completion (1-year-full-time)

- Acquire the underlying theories and hands-on applications of artificial intelligence
- Interdisciplinary and comprehensive curriculum: could select electives from Mathematics, Statistics and Computer Science
- A capstone project with real-life application
- Guest lectures by distinguished scholars and industry experts
- Internship opportunities in the AI industry and academia
- Graduates will be well prepared for careers such as software engineers, consultants and research scientists in AI and related fields such as big data and financial technology
- Expected graduation period for normal course of studies (1.5 years): Summer (July)

Programme Details
https://bit.ly/3Lz4hFS



New

Master of Science in the field of
PHYSICS

Incubating talent pool of well-versed cadres in physics

Offered by the Department of Physics, this programme is innovative and well-designed, which provides a solid education on theories, techniques and frontier developments, emphasising a balanced and flexible approach. With a strong focus on catering to the academic and career aspiration of students, developing their own specialty in subject knowledge and technical skills.

Host
Department of Physics

Programme Features

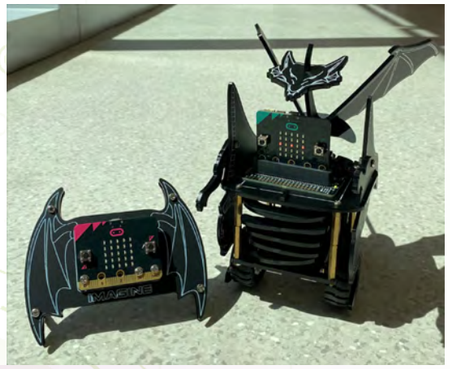
1-year-full-time programme

- An innovative and well-designed MSc programme that prepares quality physicists for the high-technology workplace
- Provides a flexible yet solid education on theories, techniques and frontier developments in physics including:
  - **astrophysics**
  - **computational physics**
  - **condensed matter physics**
  - **device and nanophysics**
  - **photonics and quantum information**
- Strengthens students' background to cope with ever-evolving challenges
- Prepares graduates to pursue another master or doctoral degree in a wide range of science or engineering disciplines
- Highly valued by many employers for MSc degree holders in physics with advanced preparation in mathematics, laboratory skills, and programming
- Promising employment opportunities, especially in the high-technology industry
- Expected graduation period for normal course of studies (1 year): Winter (November/ December)

Programme Details
https://bit.ly/3wWH38F

STUDENTS CORNER

Student Entrepreneurs Developed an Innovative Gadget
Unleashing STEM Creativity of Young Children



Quality STEM education is key to equipping our future generation with skills to tackle pressing challenges in the 21st century. Three science undergraduate students, Davis Iat Cheong CHAN and Sin Sum CHOI (both in BEd&BSc in Physics Education), and Jasmine So Yee CHEUNG (BSc in Chemistry), took the lead to develop an innovative gadget called 'Imagine:bit' to make STEM education fun and effective for young children.

This playset is a DIY remote-controlled 2-in-1 Dragon Racer powered by micro-bit, an open source hardware ARM-based embedded system. By building a dragon racer and a remote controller from scratch, children can play a fun myth-themed computer game, as well as modify the underlying codes to create their own game levels. This experience does not only spark children's creativity and innovative thinking, it can also nurture their STEM-related knowledge and programming skills.

'Our creativity and dreams in game design should never be hindered by the seemingly overwhelming codes,' said Davis, the Chief Gaming Officer of Imagine:bit, 'I believe that a fun game can be created even with the simplest tools.'

Jasmine, the co-founder of Imagine:bit said the team devoted a lot of efforts to make the Dragon Racer the best learning and fun experience, 'It is a truly unique playset, and I hope young children will find the engineering principles of the racer interesting, and most importantly, enjoy playing with it!'

Learn more about Imagine:bit:
https://bit.ly/3uKYzK4

Hit a Job Interview
Simulate Your Performance with an AI Interviewer

Have you ever thought of having some mock interviews before the actual one? One may keep this handy and simply turn to peers for rehearsals, but not all their partners have the backgrounds to provide constructive and valuable feedback in such practices.

In light of this, our student team in the Master of Statistics programme of the Department of Statistics and Actuarial Science (SAAS) developed an Artificial Intelligence Video Interview Analyser to assess the overall performance of candidates during mock interviews.

Eyes sometimes speak louder than words. This analyser makes good use of eye gaze, an essential cue to determine important nonverbal behaviours. By measuring the focal point of the candidates' vision, the analyser can tell who are more confident and passionate about getting the job, alone with the gaze and eye contact they made.

Facial expression is another crucial indicator. Having applied the CNN model, this analyser incorporated six emotions in the training of facial expression dataset, namely anger, disgust, fear, happiness, sadness, and surprise, allowing the trained model to predict the self-confidence level of candidates.

Understand candidates' ability in consolidating thoughts and discipline knowledge into meaningful answers is always a top priority for potential employers, the analyser also facilitates the comparison of keywords extracted from candidates' answers against the model answers in written assessments, enhancing their performance and skill sets required.

The analyser was a winning project of the AI Robotics Vision and Automation Technology Challenges Competition 2021 organised by SAAS Data Science Lab. After the Competition, Academy of Professional Certification, one of the sponsors of the competition, will offer a mentorship workshop to the team on how to set up a start-up and look for potential funds.

Members of the team: Mr Jason Jin An CHAN, Mr Tsz Hin CHAN, Miss Si Man TONG, Mr Tsin Wai YAU and their mentor Dr Adela LAU.

Video presentation of the project:
https://youtu.be/Rpmk8R4uKtE

Learn more about the competition:
https://bit.ly/3hxtwLX


An artist's reconstruction of a baby oviraptorosaur in its egg. Image: Julius Csotonyi

ALUMNI CORNER

More than 99% of the species ever lived on Earth are extinct. However, these extinct organisms are exceedingly important to our understanding of the total biodiversity and transitions in the history of life. As a researcher in vertebrate palaeontology, Fion Wai Sum MA, our alumna from Department of Earth Sciences, uses fossil records to study evolutionary processes in vertebrate history.

Reconstructing How Dinosaurs Fed and Grew

Dinosaur embryo was about to hatch!

On the left | Baby Yingliang measures 10.6 inches (27 cm) long from head to tail and rests inside a 6.7 inch-long egg at the Yingliang Stone Nature History Museum in China.

On the right | Fion applied digital modelling and functional analysis to study the feeding mechanics of theropod dinosaurs. Image credit: Gabriel Ugueto.

Her discovery sparkling international media attention


Photo credit: BBC NEWS

Recently, Fion co-led an international team to study the oviraptorosaur 'Baby Yingliang', one of the best-preserved dinosaur embryos ever discovered and figured it was about to hatch its egg at the time. The team suggested that the bird-like posture of 'Baby Yingliang' may indicate a similar prehatching behaviour in oviraptorosaur and modern bird embryos and that the avian tucking behaviour could have originated among dinosaurs. Again, this shows that the features previously thought unique to modern birds could have first evolved among their dinosaurian ancestors.

Hong Kong-born palaeontologist 'hatched' from HKU Science

During her time as an undergraduate at HKU, Fion was supported by a Summer Research Fellowship (SRF) and an Overseas Research Fellowship (ORF) to gain her first research experience. For two summers, She conducted research locally and at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP), the Chinese Academy of Sciences in Beijing. These experiences ignited her growing interest in this field and encouraged her to become a vertebrate palaeontologist.

Fion was under the supervision of palaeontologist Dr Michael PITTMAN.

Hope of returning home…

Currently pursuing her PhD study at University of Birmingham, Fion would like to continue her research career after graduation by applying complementary techniques to further explore topics on vertebrate dietary evolution and dinosaur growth.

Although no dinosaur fossils are known in Hong Kong, as a Hong Kong-born palaeontologist, Fion still hopes to return to Hong Kong for research development, because Hong Kong would serve as a great base station for her research as East Asia is home to many vertebrate fossils, especially dinosaurs.

Fion wishes to study the fossils of Hong Kong alongside her research on vertebrate palaeontology. 'Hong Kong has over 400 million years of geological history with diverse fossils, including vertebrates, invertebrates, plants, and microfossils that I would like to contribute to enriching it,' she added.

Fion Wai Sum MA

- 2019 - present PhD candidate in Earth Sciences (Palaeobiology), University of Birmingham
- 2017 - 2018 Master by Research in Palaeontology and Geobiology, The University of Edinburgh
- 2013 - 2017 Bachelor of Science, double major in Geology and Ecology & Biodiversity, HKU

Full story:
https://bit.ly/358GRru

NEWS

HKU Science Excels in QS World University Rankings by Subject 2022

According to the QS World University Rankings by Subject 2022, HKU Science continues to excel in a wide array of science disciplines. The rankings symbolise the relentless effort of all Faculty members, and we will not be complacent but devote to achieve teaching and research excellence, creating knowledge and impacts.

Ranking summary:

- *Biological Sciences: #62*
- *Chemistry: #41*
- *Earth & Marine Sciences: #51-100*
- *Environmental Sciences: #31*
- *Geology: #51-100*
- *Life Sciences & Medicine: #49*
- *Materials Science: #53*
- *Mathematics: #56*
- *Natural Sciences: #57*
- *Physics & Astronomy: #67*
- *Statistics & Operational Research #47*

In Loving Memory of Professor Douglas PAYNE

It is with deep sadness that we mourn for the passing away of Professor Douglas PAYNE on March 6, 2022 at his advanced age of 97 in London. We honour the memory of Professor Payne in many aspects, be it his contributions for the Faculty development as the Dean of Science (1968-1974), or his relentless commitment in advancing the Department of Chemistry as our longest serving Head (1966-1982).

Professor Payne's passing is a great loss to the HKU community. As one of our most respected, beloved and influential teachers in the Faculty, he was loved by generations of students – the establishment of the Douglas Prizes in Chemistry for undergraduate students by his former students in early 1990s was the best proof for that. We believe the Prizes will have ongoing influence in the academic realm and Professor Payne's spirit will continue to ignite our young bright students.

ACKNOWLEDGEMENTS

We would like to express gratitude to our donors for their recent support, which is paramount for us to grow and scale new height!

Listing of donors in alphabetical order of organisation names and surnames.

Individual donors

Mr Francis Tak Yan AU
Dr Phyllis Dip Shin KO
Mrs Jiwen OUYANG
Ms Kwan Ying SHUM

Corporate donors

Ocean Park Conservation Foundation, HK
Sai Yuen Farm Management Co Ltd
Save Pangolins
The Swire Group Charitable Trust
TCL Corporate Research (Hong Kong) Co. Ltd.

Four Chemistry Research Postgraduate Students Won the Best Presentation Awards at The 28th Symposium on Chemistry Postgraduate Research


Mr Rajat WALIA

Mr Rajat WALIA, PhD student from Department of Chemistry, was awarded the third prize in oral presentation at The 28th Symposium on Chemistry Postgraduate Research with his research 'Ab-initio DMRG's Perspective for the fundamentals and Analysis of Singlet Fission', whilst three other PhD students from the same Department, Ms Yingnan CAO, Mr Yulin DENG and Ms Cathay Chai AU-YEUNG, also received awards at the poster presentation session. The symposium is an annual event for postgraduate students to discuss the most recent advancement in postgraduate research in chemistry, and to exchange research ideas foster collaborations and build up networks.

Alumnus of Mathematics Won the HKMS Best Thesis Award


Dr Zhongjian WANG

Our Alumnus Dr Zhongjian WANG won the '2021 Hong Kong Mathematical Society (HKMS) Best Thesis Award' by his research 'Robust Lagrangian numerical schemes in computing effective diffusivities for chaotic and random flows', supervised by Dr Zhiwen ZHANG of Department of Mathematics. HKMS is supported by local mathematicians working in local universities and schools, and it has been a member of the International Mathematical Union since 1982.

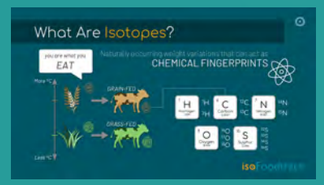
Graduates from the School of Biological Sciences Funded by Innovation and Technology Commission (ITC) to Provide Testing Services for Food Products


Dr Colin Chung-Lim LUK


Dr Inga Elizabeth CONTI-JERPE

Learn more:
https://bit.ly/3vnxAES

In collaboration with the Stable Isotope Laboratory at School of Biological Sciences(SBS), a start-up business 'isoFoodtrace' founded by PhD graduates Dr Colin Chung-Lim LUK and Dr Inga Elizabeth CONTI-JERPE from SBS, has been awarded HK$200,000 by the Innovation and Technology Commission's Technology Start-up Support Scheme for Universities (TSSSU) 2022-2023 exercise. Their start-up provides testing services for food products using stable isotope technology to determine their source and production method, detecting food fraud, and ensuring food safety.



EVENTS

January
15
2022

Public Lecture –
AI and Computational Research: from Quantum Materials to Black Holes

Dr Zi Yang MENG,
Associate Professor at Department of Physics

Dr Hugo PFISTER,
Post-doctoral Fellow at Department of Physics

In the time of quantum technology and big data, scientists start to integrate Artificial Intelligence (AI) and computational approaches into the fundament research about our mother Nature and Universe. To unfold such interesting discovery processes, the Faculty co-organised a public lecture on the topics with Hong Kong Science Museum in January 2022, two scholars from Department of Physics were invited to talk about how modern quantum material research could be used for next generation innovations, as well as how we can use simulated Universe to better interpret observations from our real Universe and understand its origin.

For lecture highlight and recap, please visit here:
https://youtu.be/UhTyWceZxJU

January
17
2022

BEST Programme by Laboratory for Space Research Unfolding the Unlimited Boundaries of the New Space

As a co-organiser of the (BEST) programme, the HKU Laboratory for Space Research (LSR) joined hands with HKU Academy for the talented and Orion Astropreneur Space Academy to give local secondary school students a chance to explore the wonders of space.

The programme is a 6-months project started in September 2021 and completed in April 22, 2022. It comprised workshops at secondary schools, webinar workshops, as well as show-and-tell workshops at LSR.

Students of 23 teams from 21 high schools were given a chance to apply basic physics knowledge to some very practical challenges, including building a CubeSat and preparing a proposal for potential investors – which can help provide solutions to global issues. There was a competition with awards and prizes for the team with best CubeSat concept and proto-type. Students were also offered the opportunities to consult with advisor experts such as engineers, entrepreneurs, and HKU student advisors.

On January 17, some school teams were gathered to attend a workshop at LSR on how to use computer-aided design tools to build and prototype a CubeSat. The programme received positive feedback from students, who felt fascinated by this eye-opening experience.

Learn more about the BEST programme: https://cubesat.hku.hk

Media story: https://bit.ly/3xcGhUY

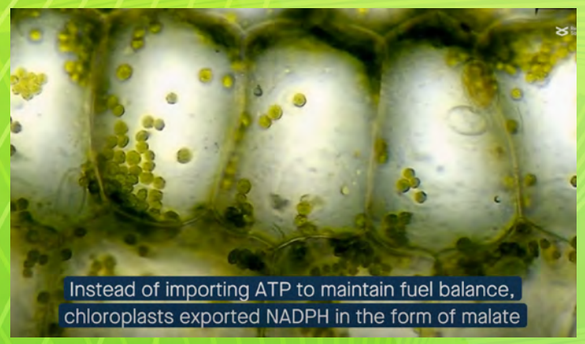
VIDEO HIGHLIGHTS

As story-telling through videos have become a popular trend in our lives, the Faculty has been creating more videos to cater the interest of the audience with this powerful tool. Check out the videos below and learn more about the work of our dedicated researchers and revisit some valuable lectures you might have missed out!

Fish Adapting Ocean Acidification

The silent sea is responding swiftly to global climate change. Check out this video about a research project conducted by School of Biological Sciences and The Swire Institute of Marine Science about how some species evolve more rapidly to cope with future ocean acidification.

Length: 1:30 · https://bit.ly/3LU2v27



How Do Guard Cell Chloroplasts Obtain Energy?

A team of international botanists including our experts from School of Biological Sciences cracked the code of how guard cell chloroplasts obtain energy.

Length: 1:55 · https://youtu.be/if9ombuYsnQ

Realisation of Topological Mott Insulator in Twisted Bilayer Graphene Lattice Mode

How to do math a thousand times faster with a pencil? Our physicists from Department of Physics will tell you all about it in this video.

Length: 1:08 · https://bit.ly/3xf0kSH

Revisit Science Distinguished Lecture: Innovation in Electrochemical Technologies for the Low Carbon Energy Transition

The speaker in this video, Professor Nigel BRANDON from Imperial College, is the founder of two companies from his academic work: Ceres Power, a fuel cell company now valued at over £2.5B, and RFC Power, developing the world's lowest-cost flow battery. Watch this video and learn from his huge success!

Length: 1:07:06 · https://bit.ly/3LQSi6l

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