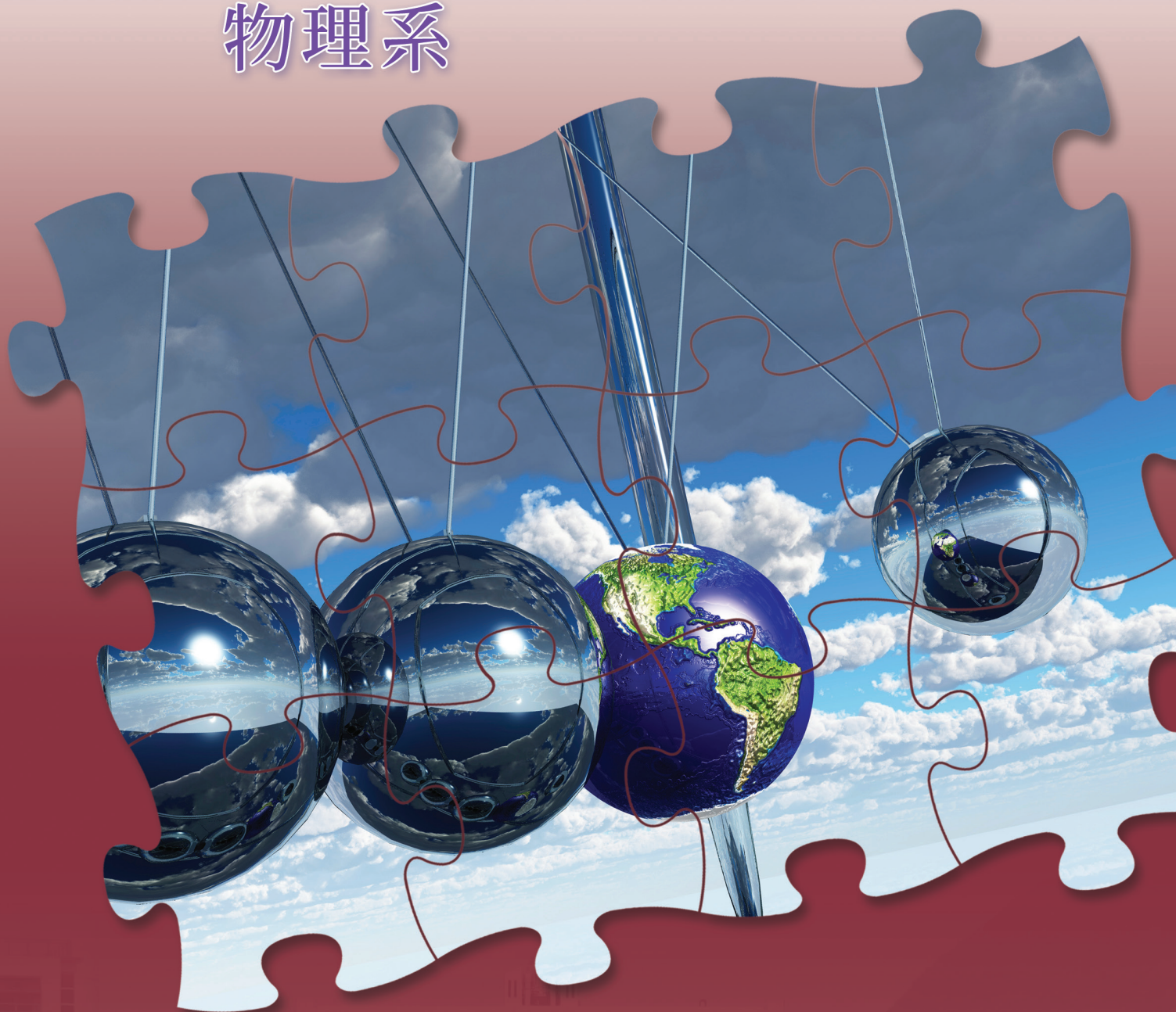


DEPARTMENT OF
PHYSICS
物理系



香港中文大學理學院
FACULTY OF SCIENCE
THE CHINESE UNIVERSITY OF HONG KONG



JS 4601 SCIENCE (Major in Physics)

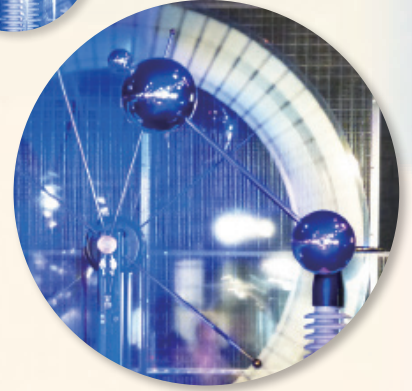
JS 4690 ENRICHMENT STREAM IN THEORETICAL PHYSICS

 <http://www.phy.cuhk.edu.hk/>

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 3943 6154

For 2025 Entry



CUHK Physics has a good and long-standing reputation in training solid physics students. As one of the oldest departments in CUHK, we have been nurturing over 3000 physics students and more than 50% of our graduates in recent years continue to pursue higher degrees in Physics or related subjects. Many of them are professors, scientists, educators, engineers, executives, and entrepreneurs in Hong Kong and around the world.

Our students and alumni

- ◆ Awarded prestigious local and overseas scholarships and fellowships every year. Placed as the top-notch students in Hong Kong.
- ◆ Awarded many University, College, and Faculty scholarships every year.
- ◆ Admitted to the top-tier PhD programs around the world with full financial support. Many of them went to the best schools in the United States, the United Kingdom, Canada, and other European countries.
- ◆ Participated in large-scale international research projects in high energy physics, astrophysics, condensed matter physics, etc, which include gravitational wave, black hole, dark matter and energy, and quantum phenomena.
- ◆ Published research papers in high-impact journals.
- ◆ Won many local and overseas competitions in data and computation science, robotics, etc.

Physics Programmes



Physics [Declare Physics as major programme after admission into CUHK Science]

- ◆ A solid grasp of fundamental concepts, supplemented with analytic, computational, and experimental skills as well as research experience.
- ◆ A balanced mix of lectures, tutorials, problem-solving sessions, seminars, group discussions, projects, and research opportunities.
- ◆ Compulsory courses provide an all-round foundation, supplemented by a pool of elective courses.

Enrichment Stream in Theoretical Physics [Direct admission into CUHK Physics via JUPAS]

- ◆ For elite students who are talented in physics and mathematics.
- ◆ Emphasis on forming a critical mass of students who are interested in solving theoretical physics.
- ◆ Tailored small-group discussion classes, supplemented various activities and projects.
- ◆ Guaranteed research opportunities starting at early stage for building up the necessary research skills and experience. Exposure to frontier theoretical research in Hong Kong and oversea.
- ◆ Mentorship with a theoretical physicist as the academic advisor on study and research. Help to explore students' research potential and bridge the gap from undergraduate physics to postgraduate studies.

Physics Curriculum



We offer a rigorous curriculum in physics education. The curriculum is divided as the Core and Streams.

The Core is compulsory, and it includes

- ◆ Classical mechanics
- ◆ Quantum mechanics
- ◆ Electromagnetic theory
- ◆ Thermal and statistical physics
- ◆ Mathematical skills
- ◆ Experimental skills
- ◆ Computational skills

for building a strong and comprehensive foundation.

Other than the Core, the Streams are optional, and they are:

- ◆ Astrophysics and particle physics
- ◆ Computational and data physics
- ◆ Quantum science and technology
- ◆ Enrichment stream in theoretical physics (JS4690)

Students select Streams in their elective courses to attain a certain depth in concepts and skills in several areas, which are useful in future studies and workplace.



Experiential Learning Opportunities

We put much effort in developing effective experiential learning activities, which form an integral part of a high-quality education. Many of these activities are unique among physics programs in Hong Kong. Examples of such extra-curricular learning opportunities include:

- ◆ Summer Undergraduate Research Exchange (SURE), which provides opportunities to students to conduct in-depth research in an overseas institution with financial support.
- ◆ Summer Teacher AppRenticeship (STAR), which provides opportunities to students to teach in a local secondary school with financial support.
- ◆ Overseas Program for Undergraduate students (OPUS), which provides opportunities to students a 6-month period to study and conduct research in University of California, Berkeley, or Fudan University with financial support.
- ◆ Internship Programs with Hong Kong Observatory, Science Museum, Space Museum, science publishers, financial sectors, and engineering firms for students to gain experience in various industries.
- ◆ Summer Study Tour, which provides opportunities for students to work in small groups to conduct a physics related field work or experiment in an overseas site.
- ◆ Summer Undergraduate Research Internship Program (SURIP), which provides opportunities for students to participate in in-house research programs.
- ◆ Co-op program, which provides opportunities to students to spend 6 to 8 months in a local company as a regular employee.
- ◆ Many University and College exchange programs for students to study in overseas universities.

These efforts, together with the final year research projects, involve students into academic research activities that can lead to publication of research papers in international journals. We also support students to report their research results in local and international conferences.



OPUS

(Overseas Program for Undergraduate Students)

This year, I have this invaluable opportunity to study and do research at the University of California, Berkeley (UCB). During my exchange there, I had the chance to explore deeper into the fields I am interested in through courses in physics, statistics and computer science. I was particularly impressed by the welcoming and inclusive environment for open discussion in classes, which encouraged me not to be afraid of asking questions and doubts.

In the following summer, I worked in the "Moving Universe Lab" led by Professor Jessica Lu on a project about finding the infrared counterparts of X-ray binaries near the Galactic Center using data from the James Webb Space Telescope (JWST). I utilized Python and various specialized packages developed by members in the lab, like SPISEA and flystar, to extract useful physics out of the JWST data. The project is still ongoing, and I hope my work can contribute to the astrophysics community someday!

My experience at UCB has given me clarity regarding my future aspirations. I hope to continue my astrophysics research and I look forward to applying the skills and insights gained during my time there on my future academic and professional journey!



– WONG Yin Lam

2024 OPUS: University of California, Berkeley

SURE

(Summer Undergraduate Research Exchange Program)

This summer, I had a privilege of being a visiting student in the sub-department of particle physics at the University of Oxford in the United Kingdom. I worked on the "SNO+ experiment" under the supervision of Professor Jeffery Tseng, focusing on supernova burst triggers. Thanks to Professor Tseng's guidance and support, I was able to attend the SNO+ Collaboration Meeting in July 2024, which brought together a significant number of physicists involved in the project at an institution near our neutrino detector in Sudbury, Canada. I also had an opportunity to present my contributions to the project there.

The experiences in both the UK and Canada were tremendously influential to me. They have provided me with invaluable insights into what conducting real-world physics research entails. The members of the SNO+ Oxford group were exceptionally helpful and welcoming, with effective communication, fostering a collaborative environment that embodies the spirit of scientific research. This experience has solidified my determination to pursue a career in physics research.

Most importantly, I am grateful to Professor Tseng for his continuous mentorship and assistance in securing additional funding, which enabled a smooth and rewarding journey throughout my time in both countries.



– HUA Yongxin

2024 SURE: University of Oxford

During my time at Brown University, I had an incredible opportunity to work in a cutting-edge physics lab. My primary responsibilities included assembling a strain cell and preparing experimental setups under a cryostat and X-ray diffraction (XRD), which required several works: wiring cables, preparing programs, designing stages and feedthroughs, selecting samples, etc. Engaging in these hands-on activities not only deepened my understanding of experimental physics but also greatly enhanced my technical skills.

Beyond the technical skills, this experience has also been a significant period of personal growth. I have developed essential coding skills for data analysis, which I believe will be crucial in my future studies and research. Additionally, I cultivate a strong troubleshooting mindset, which has instilled resilience and confidence in my problem-solving abilities.



– ZHOU Zikai

2024 SURE: Brown University

STAR (Summer Teacher AppRenticeship)

During my summer internship at Immaculate Heart of Mary College, I had the opportunity to teach physics for DSE students, delivering lessons on topics like motors, generators, and medical physics. I also engaged in extracurricular activities such as the Hong Kong Interschool Astronomy Quest Training and supervised exams. Preparing teaching materials and leading classes have improved my teaching and communication skills. This experience is incredibly rewarding, allowing me to apply my physics knowledge in a practical setting and contribute to students' educational growth. I am grateful for this opportunity and eager to use these skills in my future career.

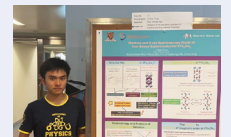


– LI Chun Wa

2024 STAR: Immaculate Heart of Mary College

SURIP (Summer Undergraduate Research Internship Program)

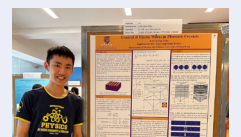
I am very happy to join the Summer Undergraduate Research Internship Program (SURIP). Before joining SURIP, I almost knew nothing about how to conduct research. This program has expanded my understanding beyond the classroom, bringing me the taste of cutting-edge research in solid-state physics. It greatly has increased my interest in physics. Additionally, SURIP has given me a better understanding of the research process, such as literature searching to understand the problem and the steps involved in brainstorming and improving research ideas. They all play an important role in shaping my future research direction. The research group is very friendly, and the time we spent together was very pleasant. They provided me with a lot of help when I was confused about issues, and they patiently explained concepts that I didn't understand. I would like to express my sincere gratitude to them. In conclusion, SURIP is the most meaningful activity I have participated in since joining CUHK Physics. I am very grateful to the department for providing such a valuable opportunity for me and all physics students.



– LI Sze Tung (1 Place Winner)

2024 Summer Undergraduate Research Internship Programme

This summer, I had a wonderful opportunity to participate in the Summer Undergraduate Research Internship Program (SURIP) project focusing on the band structure of phononic crystals. Through this experience, I deepened my understanding of solid-state physics, gained hands-on experience in theoretical investigations, and developed my ability to translate physics equations into numerical computations. The problem-solving skills I acquired during this project are essential for my future career. In particular, the debugging process in computer programming was both rewarding and educational. Although it usually took weeks to complete the tasks, seeing how I could finally solve them was truly wonderful. During the poster session, I gained invaluable experience in effectively conveying my ideas to others. Overall, this project enriches me with theoretical, computational and communication skills, and prepares me for a scientific career. I am sincerely grateful for this internship program and the opportunity to collaborate with many inspiring researchers.



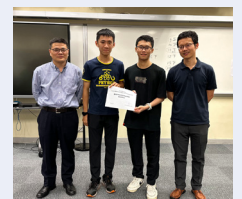
– Law Chun Man (2nd Place Winner)

2024 Summer Undergraduate Research Internship Programme

During my summer internship, I had the opportunity to participate in an experimental project focused on optics and plasmonics. This experience allowed me to study advanced concepts in the field, significantly enhancing my understanding of the subject.

I had the chance to apply theoretical concepts in a practical setting, which greatly improved my experimental skills. I learned how to set up complex experiments and analyze data effectively. Moreover, as not every experiment went as planned, I also encountered various challenges that required patience and persistence. These challenges ultimately improved my ability to adapt to the situation and solve difficult problems.

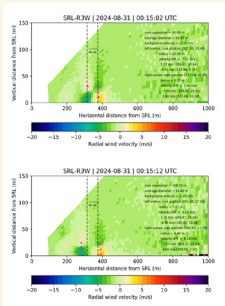
In addition to honing my technical abilities, this internship also provided me with the opportunity to improve my communication skills within a team environment. Collaborating with fellow interns and researchers required clear articulation of ideas, active listening, and constructive feedback. Overall, this summer internship was an invaluable experience that not only deepened my knowledge of optics and plasmonics but also equipped me with essential skills for my future career in research.



– WU Kai (2nd Place Winner)

2024 Summer Undergraduate Research Internship Programme

Internship & Placement Programs



It is a valuable opportunity to work in the Hong Kong Observatory. My research focused on developing and testing algorithms to identify and track aircraft wake vortices. I also went through various research papers related to my research topic, allowing me to deepen my understanding of the trends and methodologies in the field. I worked with the short-range LiDARs installed in Hong Kong International Airport (HKIA) remotely to collect wind speed data and visualized the data. Parameters are also annotated next to the plots for real-time analysis. The product may increase the capacity of HKIA and give alarms to pilots regarding potential dangers during landing.

– SHIU Tsui Kwan

2024 One Year Placement in Hong Kong Observatory

I took an internship at United Prime Publishing Co. in this summer. My job mainly included preparing solution manual and editing the question bank for the NSS physics curriculum. The experience has been rewarding.

This was my first time doing editorial work, and I faced many difficulties, such as using tools like InfraView and LaTeX for preparing solutions. Nonetheless, my supervisor and senior colleagues guided me through these tasks.

Besides learning how to use the editorial tools, my internship has inspired me a lot in teaching and learning. Preparing solutions is not just working out all calculations in a precise and concrete manner; it is more about demonstrating an understanding of physics. This is what my supervisor emphasized. He provided me with many references and guidance to help me prepare solutions for building students' intuition in understanding the physics behind.

This internship also provided me with many transferable skills, such as how to communicate effectively with colleagues, which is useful in any workplace.

In conclusion, this internship opportunity has given me a lot of valuable experiences, and I recommend it to other physics students strongly.

– LEUNG Chi Suen

2024 Summer Internship at United Prime Educational Publishing



What Our Students Say

Choosing a university program could be challenging since you need to dedicate yourself to a subject for a whole 4 years and possibly in your career. But if you want to dive into the world of physics, CUHK Physics is the way to go! Do not be scared off by the difficulty of advanced topics such as quantum mechanics, general relativity, and solid-state physics. Professors and lecturers here are very willing to help, even weak students who are struggling to catch up in class. Teaching assistants, who studied similar courses a few years ago, could provide more down-to-earth tips for you to learn the course more effectively. Think about the enjoyment when you understand these subjects and can appreciate some latest achievements in these fields. To further concrete the knowledge in class, CUHK provides a wide range of research experiences every summer. In the first two years of summer break, I joined SURIP and collaborated with the HK Space Museum. These allowed me to experience the entire research process from taking data to publishing a paper. In my last summer break, I visited the Large Hadron Collider in CERN via SURE. Over the summer, I participated in lectures, equipment testing and data analysis work. Various scholarships from the physics department and college cover all my expenses during the trip. Allowed me to enjoy a 2-month journey of particle physics in Switzerland.



– Luk Ho Ching

(ESTP, graduated in 2024)

Department/Programme Scholarship awardee from Shaw College (2023-24)

Certificate of Academic Merit awardee from Shaw College (2023-24)