

# 物理 (PHYS)

## 課程重點

物理學涵蓋範圍廣泛，從最微小的粒子到整個宇宙的形成都能以物理學的角度分析，是現代科學及工程學的基礎。物理學系學生有機會研習各種有趣的課題，如：量子計算、納米科技、夸克子、黑洞以及超導體等。

此主修課程提供以下兩個專修科目：

- 榮譽物理 - 此專修要求學生在最後一學年完成一項研究專案及通過論文考核，為學生日後升讀研究院課程打下穩固基礎。
- 物理及數學 - 此專修適合對物理及數學均有興趣的學生，且對學生日後修讀理論物理學有很大幫助。

物理學系為學生提供既深且廣的課程，學生修畢課程後會擁有堅實的物理知識，以及分析推理和實踐實驗的能力。學生在畢業後可從事與科學相關的工作，或繼續升學深造。

## 就業前景

畢業生可選擇繼續進修，或投身教育、研究、技術性銷售、法證、醫藥、商業、及銀行等行業。課程培養出學生良好的分析力及解難能力，使學生可投身於不同的行業。此外，政府機構或私營機構均提供充足的就業機會予物理學系的畢業生。

## Introduction

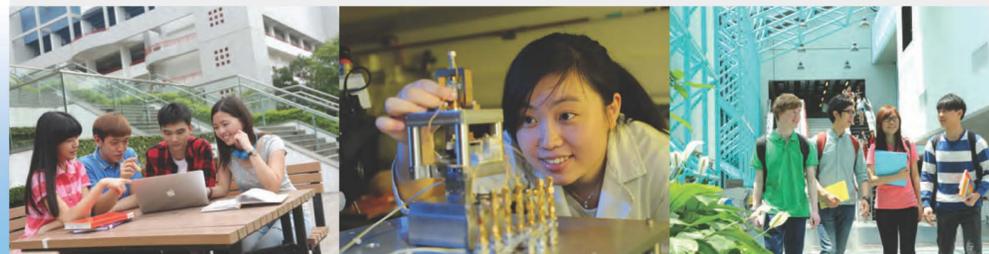
Physics is the science that explores the fundamental laws of nature and their consequences. It provides the foundation for other sciences and engineering. The HKUST Department of Physics, due to its strength in research, has been consistently ranked among 50-100 in the world and No.1 in Hong Kong for many years. The 36 professors (10 of whom, including George Smoot, Noble Laureate in Physics 2006, are fellows of the American Physical Society) pursue research at the frontier of cosmology and high-energy physics, cold atoms and quantum optics, nanoscience, condensed matter physics, photonic and metamaterials, soft materials and biophysics, computational physics and information theory.

The Physics undergraduate program provides students with rigorous training in the broad areas of physics. Together with various undergraduate research opportunities and scholarships, the program prepares students for further studies in physics and related fields. For students who intend to pursue career in industry, education, R&D, technical sales, commerce and banking sectors, the program offers a flexible curriculum catering for their needs.

## Program and Curriculum

The BSc in Physics program provides a solid physics curriculum for students with different career aspirations. For students aiming for further studies such as PhD in physics or related fields, they have the opportunity to take advanced courses to build a solid foundation and are encouraged to seek opportunities in undergraduate research. For students with other career goals, the curriculum provides training of analytical and computational skills that will help the students meet challenges in all sectors of society. The curriculum is flexible so that a significant fraction of our students choose to pursue a minor in other subjects in addition to the major degree in physics.

The basic program offers required courses in classical mechanics, electromagnetism, quantum mechanics, statistical mechanics and laboratory courses and many elective courses including Big Bang Cosmology and Inflation, Computational Physics, Lasers and Optical Electronics. On top of the basic program, students who complete additional required courses with strong academic performance will graduate with the following options or track:



■ **Applied Physics Option:** for students planning for a career in industry-related jobs. Students take additional courses in subjects such as material science and optics.

■ **Physics and Mathematics Option:** for students choosing theoretical physics who benefit from extra training in mathematics.

■ **Honors Physics Option:** for students aiming to pursue further studies in PhD programs. Students will take honors versions of courses such as quantum mechanics and electromagnetism. Students are also required to complete a capstone research project.

■ **International Research Enrichment track:** for students admitted into the School of Science International Research Enrichment program. Apart from taking honors versions of fundamental physics courses, students are also required to participate in research projects in foreign universities.

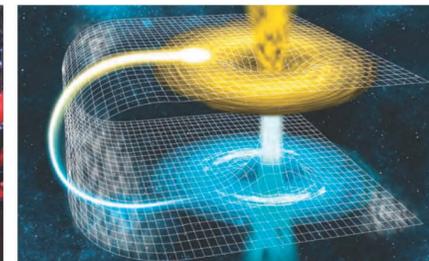
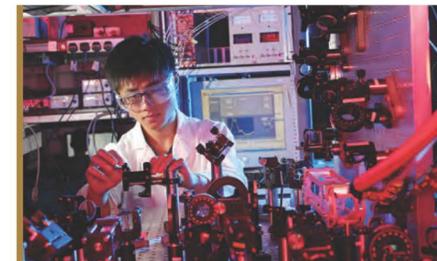
### Minor Program in Astrophysics and Cosmology:

This minor program includes new courses in the areas of particle physics, stellar astrophysics and big bang cosmology, most of which are taught by our faculty in the newly-formed Particle Theory and Cosmology group.

### Minor Program in Biological Physics

Offered jointly with the Division of Life Science, this program aims to train students to understand biological phenomena from a quantitative point of view and to work effectively in areas that require knowledge of both physics and biology.

## Research Highlights



The Particle Theory and Cosmology (PTC) group includes the faculty members working on various problems related to the evolution of the universe from the past to the future. They also study the most fundamental particles in the universe and the interactions between them. The PTC group is recently strengthened by the addition of Prof. George Smoot who won the Physics Nobel Prize in 2006 for his measurement on the cosmic background radiation of the universe.

The Quantum Materials group includes more than ten experimentalists and theorists, studying novel materials such as graphene and other atomically thin materials, semiconductors, topological materials and superconductors. Materials are grown in vacuum conditions and then usually studied at temperatures close to absolute zero degree to probe their quantum properties.

The Soft Matter and Biophysics group consists of six faculty members addressing fundamental questions concerning a broad range of soft and biological systems. These include the nature of colloidal crystals and glasses, interactions between vesicular and membrane proteins based on nanometer-precision fluorescence microscopy, mechanisms of neuronal death, fluctuations in a contact line, dynamics of polymers at an interface and under nanoconfinement, charge separation phenomenon at a solid-liquid interface, and fundamental science questions about water, carbon cycle and clean energy. The experimental works often involve building new instruments or developing new sample fabrication methods. Some theoretical works employ the most powerful supercomputers in the world.

## Career Perspectives

The physics curriculum helps students develop a broad range of knowledge and skills, including problem solving, reasoning, numeracy, technical, communication, and information and technology. As such, our graduates have set foot in a variety of careers in both academic and non-academic fields. The majority of the physics graduates who desired to pursue a higher degree were accepted into Ph.D programs at the top universities around the world, including Harvard, Princeton, Cornell, Stanford, Columbia, UC San Diego, etc. Our graduates who decided to pursue a career after graduation found employment in the education, engineering & industry, information and technology, marketing, finance, and banking sectors, etc.



## Sharing of our graduates

*"I have always been passionate in looking for creative solutions to solve different problems. Starting my business is like a science experiment - you identify a problem, construct a hypothesis, experiment different possibilities. You must have perseverance to strive for the best solution!"*

**Francis KWOK**  
Co-Founder & Chief Executive Officer, Radica Systems Limited

*"My friend introduced the career of Medical Physicist to me, which I can apply physics in the healthcare setting. My career brings me a lot of satisfaction, as my expertise ensures that the cancer patients can receive quality radiotherapy treatment, with adequate treatment design and proper equipment."*

**Tony KONG**  
Medical Physicist, Hong Kong Sanatorium & Hospital

*"You are free to choose your own curriculum in the Department of Physics of The Hong Kong University of Science and Technology. I took many advanced courses in physics including some courses for postgraduate. It broadened my horizon in Physics and sparked my interests in Physics."*

*You have chances to participate in research and learned from the world-class researchers in the Department of Physics of The Hong Kong University of Science and Technology. I started my research in my first semester. Research is challenging and time consuming, meanwhile, it is full of creativity, exploration and enjoyment. I learnt how to conduct research and summarize the results into research papers. These skills are extremely useful in my future careers."*

**LAM Ho Tat**  
International Physics Olympiad gold medalist (2012)  
Ph.D student, Princeton.