HKU Science
Curriculum Structure

- Common admission to 6901 Bachelor of Science
- Provide great flexibility and multiple curriculum options for students’ own development
- 14 majors and 4 intensive majors offered, declare major after the second year of study at the latest
6901 Bachelor of Science in 2018

14-in-One: one entry in application for a choice of 14 Science majors (except Actuarial Science - 6729)

Biochemistry
Biological Sciences
Chemistry
Decision Analytics
Earth System Science
Ecology & Biodiversity
Environmental Science

Food & Nutritional Science
Geology
Mathematics
Molecular Biology & Biotechnology
Physics
Risk Management
Statistics

4 intensive majors offered: Chemistry, Ecology & Biodiversity, Geology, and Molecular Biology & Biotechnology
# 6901 Bachelor of Science in 2018

14-in-One: one entry in application for a choice of 14 Science majors (except Actuarial Science - 6729)

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4 intensive majors offered: Chemistry, Ecology & Biodiversity, Geology, and Molecular Biology & Biotechnology
Major-Minor and Double-Major Options

Large number of minors and second majors in Science, Arts, Social Sciences, Business & Economics, Engineering, etc.

(Quota & Timetabling restrictions may apply)
A few facts about Department of Physics

- Number of teaching staff: 23
- Teacher to undergraduate ratio: 1:5.96
- Tutor to undergraduate ratio: 1:2.49
- Research publications (refereed): ~272/yr
We offer one major and two minors

- **Physics Major**
  - New Curriculum Structure for incoming students in 2018
  - **Aim**: Educating all-rounded physics students which best fit their interest and expertise
  - Learn the “**physics skill set**” first:
    - Computing, mathematics, model-building, problem solving
  - Follow with core courses for physics undergraduates:
    - Introductory level (Years 1 and 2): fully integrating usage of calculus and vectors; stress daily life connections
    - Advanced level (Years 3 and 4): formal training in physics with more abstraction and advanced mathematics
We offer one major and two minors

- **Physics Major**
  - **Themes**: *(optional)*
    - Cluster of courses to build expertise in specific areas
    - Enhanced training in preparation of postgraduate studies
      1. Astrophysics
      2. Computational Physics
      3. Experimental Physics
      4. Theoretical Physics
  - **Capstone Experience**:
    - Learning experience which integrate previous education
    - Examples: Final year project, Directed studies, internship,...
Skill Set Courses
- Computing
- Mathematics
- Model building
- Problem solving

Introductory Core Courses
- Calculus-based physics incorporated with vectors
  - Stress daily-life connection
  - Mechanics, Electricity & magnetism,
    Heat & thermodynamics, Quantum physics
Advanced Core Courses
- Formal training in physics with more abstraction
- Advanced mathematical skills required
- Core undergraduate physics education

Selection of Themes
(1) Course cluster to build expertise in specific area
(2) Capstone project related to the theme
(3) Enhanced training in physics for postgraduate studies

Astrophysics Theme
Astronomy laboratory
Cosmology
Interstellar medium
Observational astronomy
Planetary science ...

Computational Physics Theme
Computational physics
Data analysis & modeling in physics
Machine learning in physics
Theoretical physics ...

Experimental Physics Theme
Atomic & nuclear physics
Laser & spectroscopy
Physics laboratory
Physical optics
Solid state physics ...

Theoretical Physics Theme
Adv. electromagnetism
Adv. quantum mechanics
General relativity
Particle physics
Theoretical physics ...
Intensive Major in Physics

• Intensive Major in Physics (subject to approval)

➢ For incoming students starting from 2019

➢ Provide students with a solid foundation on the subject in breadth and depth

➢ Prepare students for further studies in physics and related disciplines as well as jobs that require deep discipline specific knowledge

➢ Increase the minimum number of credits for a major from 96 of 144 (including 12 credits for science foundation courses)
Physics Related Minors

• **Astronomy minor**
  - Suitable for both physics and non-physics major students
  - Training on both observational and theoretical aspects
  - Advanced courses in astrophysics will continue to be offered to both undergraduate and postgraduate students.
  - Despite cancellation of Major, Department will continue to aggressively pursue astronomical research and recruit postgraduate students in astronomy.

• **Physics minor**
  - Basic foundation of Physics
  - Helpful for study of other science disciplines
What will I learn studying Physics?

• Understanding the world (How things work?)
• Discovering relationships
• Quantitative thinking
• Hands on experience with wide range of equipment
• Problem identification and solving
• Designing research plans
• Communication skills (oral presentation, writing reports, …)
• Working really hard 😊
Learning Improvement Programmes

- Teacher-student advising
- Teacher consultation hours
- Head’s forum
- Monthly Activity
- Teaching quality committee with student participation & feedback
Research Areas & Laboratories

• Atomic and Quantum Physics
• Astronomy and Astrophysics
• Experimental Condensed Matter and Material Science
  • Laser Spectroscopy Laboratory, Material Physics Laboratory, Semiconductor Laboratory, Surface Science Laboratory, Optoelectronics and Nanomaterial Laboratory, Quantum Device Laboratory
• Experimental Nuclear and Particle Physics
• Telescope Dome
• Theoretical and Computational Condensed Matter
Research Areas & Laboratories

Staff:
- 19 professoriate staff
- 3 Research Assistant Professors + 4 lecturers
- 12 supporting staff (technical & clerical)

Research Areas:
- Atomic and Quantum Physics
- Astronomy and Astrophysics
- Experimental Condensed Matter and Material Science
- Theoretical and Computational Condensed Matter Physics
- Experimental Nuclear and Particle Physics
Why HKU Physics?

- Long standing tradition of rigorous physics training
  Alumni in academic, business, and governmental leadership positions

- Faculty with diverse research interest
  *Broad range of courses taught by expertise staff on that topic*
  Outside experts invited to offer specialty courses

- A friendly learning environment
  Small class size
  *Low student-to-teacher ratio (lower than 6:1)*
Why HKU Physics?

- Outstanding track record on research
  
  Publications, impact factors, external research grants, RAE by RGC

  *Many channels for students to get involved*, e.g. research project courses, summer research assistant, overseas research internship

Center for Theoretical and Computational Physics

  Prof. D. C. Tsui (Hon. Director) [1998 Nobel Laureate]
  
  Prof. F. Wilczek (Hon. Advisor) [2004 Nobel Laureate]
  
  and etc.
Excellence in Securing Research Grants (Physical Science)

2015/2016 RGC GRF Physical Sciences Discipline

2016/2017 RGC GRF Physical Sciences Discipline

2017/2018 RGC GRF Physical Sciences Discipline

2018/2019 RGC GRF Physical Sciences Discipline
Why HKU physics?

Physics Department Summer Internship program

**Requirement**: 8-10 weeks in academic and non-academic overseas or locally

**Overseas**: Princeton (w/ Prof D. Tsui 崔琦教授), Cambridge (w/ Prof Littlewood), Harvard, Stanford (w/ Profs S. Doniach, S.C. Zhang, R. W. Romani), ETH Zurich (w/ Prof T.M. Rice), Mullard Space Science Laboratory UCL (w/ Prof K. Wu and G. Aeppli), UC Berkeley (w/ Prof F. Wang), UCLA, CERN, Caltech (w/ Prof Y.L. Yung)

**Local**: HK Observatory, HK Space Museum, HK Science Museum, Ho Koon Nature Education cum Astronomical Centre

**Education**: Cheung Sha Wan Catholic Secondary School, St Francis of Asissi College, Yu Chun Keung No 2 Memorial College
Outside Classroom Learning Opportunities:
Overseas Summer Research Fellowship (8-10 weeks during summer)

- Participants engage in research fields of their own choosing; Physics Department match interest with researchers
- Reimbursement up to $12,000 per participant

2017-18 summer

Eric Chong (experimental neutrino physics) with Prof John Tseng, Univ of Oxford

Jimmy Lee (experimental particle physics) Prof Aurelio Juste, ICREA, Spain (Work @ CERN)

Peng Lianghui (experimental condensed matter physics) Prof Yiliang Ye, Univ of British Columbia
Outside Classroom Learning Opportunities:

Summer Internship
(8 weeks during summer)

• Participants engage in actual work to apply their book knowledge
• Department arranged for selected candidates to be interviewed by the institution

2018 summer

Kam Lok Man (HK Space Museum)

Ng Tung Yin (HK Science Museum)

Chan Tsz Kwan & Kwan Man (Ho Koon Astronomical Centre)
Outside Classroom Learning Opportunities:
Summer Internship (Secondary Schools)
8 weeks during summer

- Participants engage in actual work to apply their book knowledge
- Department arranged for selected candidates to be interviewed by the institution

2018 summer

Tang Yuen Shan (Yu Chun Keung No 2 Memorial College)
Chan Chun (St Francis of Assisi College)
Mak Yu Hin (Cheung Sha Wan Catholic Secondary School)
Outside Classroom Learning Opportunities:
Undergraduate Overseas Experiential Learning Activities (1-2 weeks)

Summer School on Observational Astronomy (June 2016)
Mixture of classes and hands-on project (80% air-fare + local expense paid)

National Tsing Hua University
Outside Classroom Learning Opportunities:
Undergraduate Overseas Experiential Learning Activities (1-2 weeks)

Summer School on Observational Astronomy (June 2017, 2018)
Lectures and hands-on projects (80% air-fare + local expenses PAID)

Max Planck Institute for Astronomy, (Heidelberg, Germany)

~10 HKU students every year (mostly Year 3 or 4) who have taken Astronomy courses
Outside Classroom Learning Opportunities:
Undergraduate Overseas Experiential Learning Activities (1-2 weeks)

Summer School on Nuclear Physics at RIKEN (2016, 2017, 2018)
Together with Peking University & Seoul National University
(80% air-fare + local-expense paid)

6 HKU students who attended nuclear physics enrichment training before
Career Prospects

Government:
- Administrative Officer
- Executive Officer
- Scientific Officer (HK Observatory)
- Physicist (Health Department)
- Hong Kong International Airport

Industry & Commercial Firms:
- Assistant Manager
- Staff Accountant
- Computer Programmer
- Financial Consultant
- Researcher

Companies include: HSBC, Standard Chartered Bank, The Hongkong Electric Co., others include publishing, communications, logistics, etc.

Education:
- School Teachers in local secondary schools and International schools
Where did our students go for further studies recently?

- Princeton University
- Stanford University
- University of Oxford
- University of Cambridge
- University of Chicago
- McGill University
- Columbia University
- University of Michigan
- Brown University
- Imperial College London
- Johns Hopkins University
- MIT (Massachusetts Institute of Technology)
- University of Texas at Austin
- California Institute of Technology
- University of California, San Diego
- University of California at Los Angeles (UCLA)
- University of Illinois – Urbana – Champaign
- Stony Brook University, State University of New York
- University of Tokyo
- Max Planck Institute for Radio Astronomy
- Universität Hamburg
- Leiden University
How did our 2015 Physics, Astronomy, and Math/Physics graduates do?

2015 Graduates

- Civil Service
  - Enumerator
  - HKSAR - Census and Statistics Department

- Educational Institutions
  - Research Assistant
  - City University of Hong Kong

- Commerce and Industry
  - Technician
  - Artcom Computer Project Co Ltd
  - Associate Relationship Manager
  - MetLife, Inc.

- Employed 67%
- Further Studies 27%
- Others 6%

Total: 100%
How did our 2016 Physics graduates do?

2016 Graduates

**Educational Institutions**
- Research Assistant
  - City University of Hong Kong
- Teaching Assistant
  - Society of Boys’ Centres Chak Yan Centre School

**Commerce and Industry**
- Lab Technician
  - CMA Industrial Development Foundation Limited
- Database Programmer
  - DBP Solutions Limited

- Others
  - 17%

- Further Studies
  - 13%

- Employed
  - 70%
How did our 2017 Astronomy and Physics graduates do?

2017 Graduates

- Civil Service
  - Administrative Assistant
  - HKSAR - Mandatory Provident Fund Scheme Authority

- Commerce and Industry
  - Programmer
  - Purchaser
  - Panasonic Corporation
  - Quality Assurance Engineer
  - Million Tech Development Limited

- Employed: 52%
- Further Studies: 45%
- Others: 3%
Thank you!

Q & A time

Please find the helpers outside to join the lab tour.

HKU Department of Physics

homepage: http://www.physics.hku.hk/