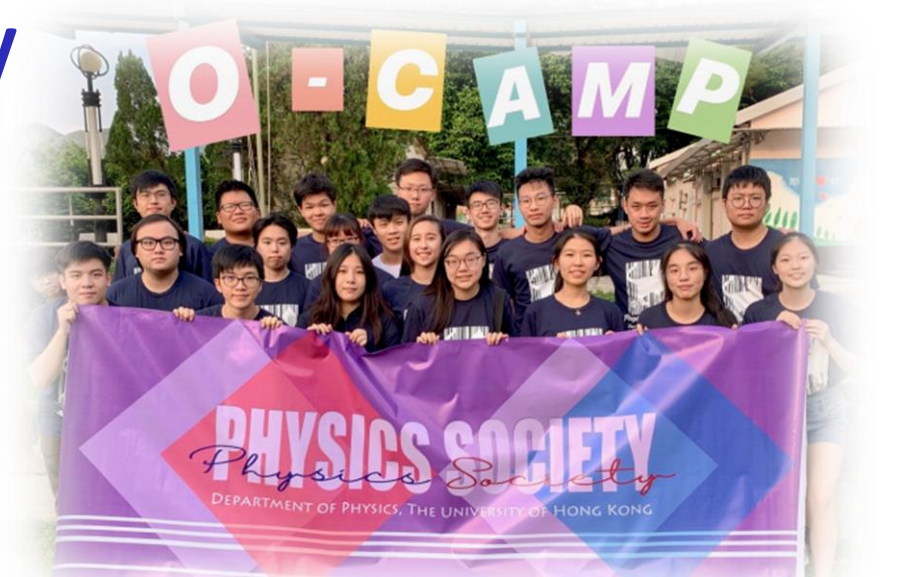




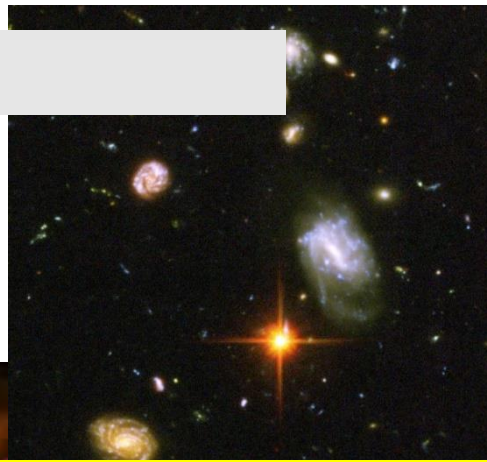
Major in Physics
Major in Physics (Intensive)

Minor in Physics
Minor in Astronomy

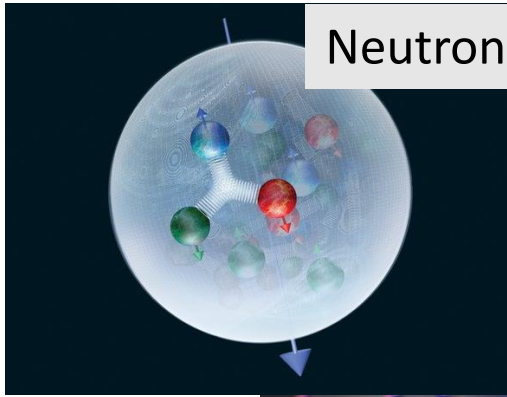




Galaxies

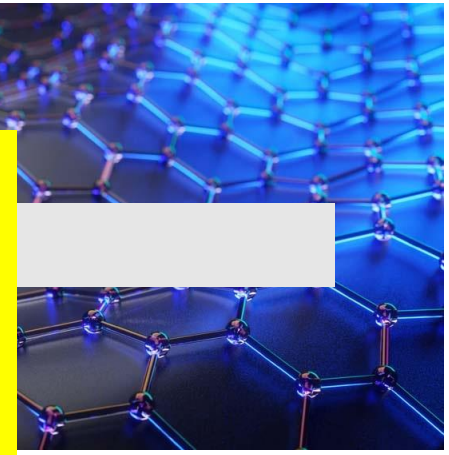


Neutrons

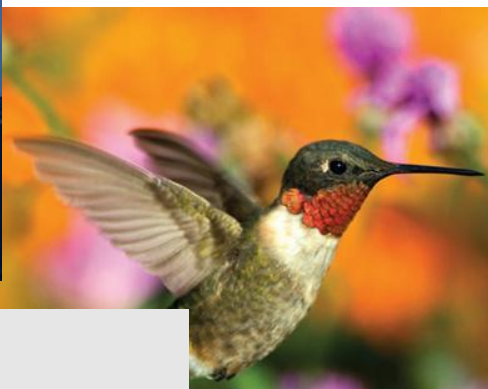


Sun-Earth

Why Physics?
**A diverse universe around us,
and we have many questions.**



Ocean wave



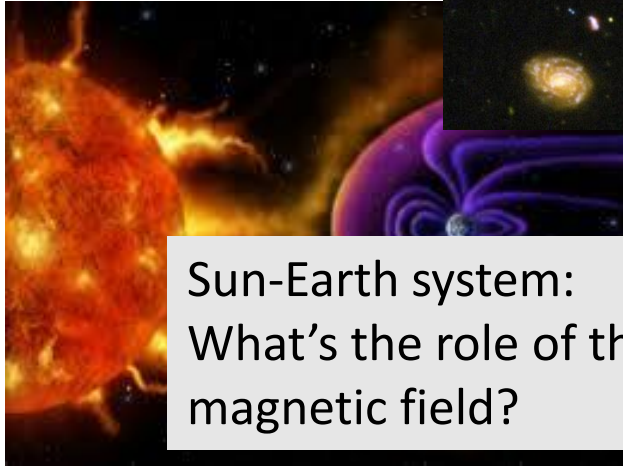
Hummingbird

E.Coli bacteria



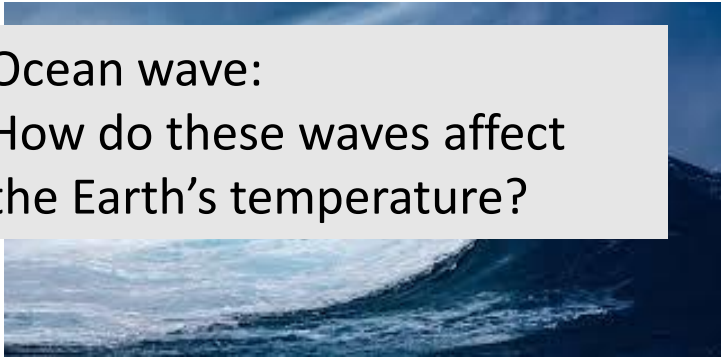


Galaxies:
What caused galaxies to have different shapes?

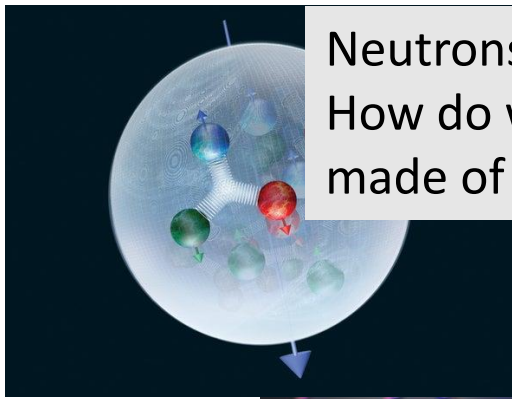


Sun-Earth system:
What's the role of the Earth's magnetic field?

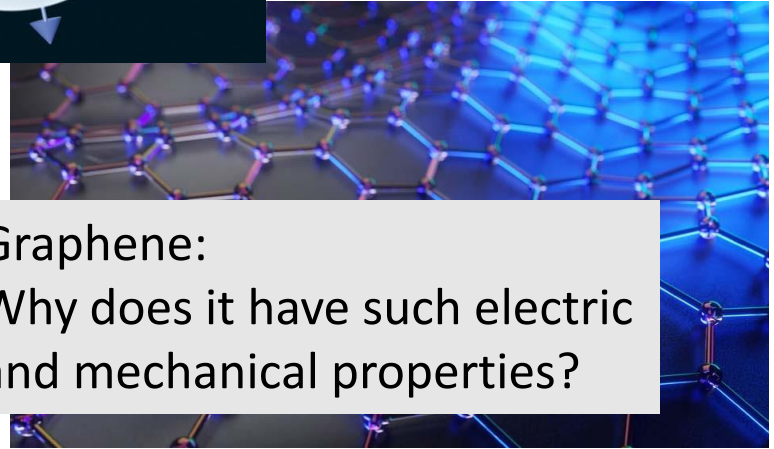
Ocean wave:
How do these waves affect the Earth's temperature?



Hummingbird:
How can they maintain this "suspension in air" position?



Neutrons:
How do we know they are made of three quarks?



Graphene:
Why does it have such electric and mechanical properties?



E.Coli bacteria:
How can these bacteria navigate around?



Galaxies:
How long does it take the galaxies to form?



Sur
Wh
ene

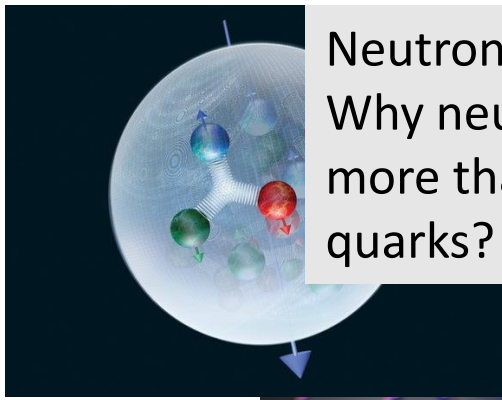
Ocean waves
Where does the Earth get the energy to initiate the waves?



Hummingbird:
What dictates their bright colors?



Neutrons:
Why neutron weighs much more than its three quarks?



ns

Why Physics?
Physics is a powerful way to understand the natural world, hence giving solutions to human's challenges.

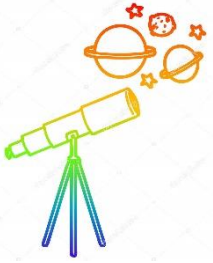
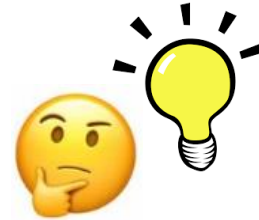
E.Coli bacteria:
Why some E.coli were so harmful to human?





Skill set after a university physics training

- 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, ...)





Majors and Minors

- **Physics Major (96 credits; 16 courses)**
 - **Large flexibility** in curriculum, lead to diverse career paths
- **Physics Major (Intensive) (144 credits; 24 courses)**
 - **Comprehensive training** in physics, targeted for students who want to pursue Master or PhD in physics or other science/technical disciplines
- **Astronomy Minor (36 credits; 6 courses)**
 - Suitable for all students (BSc or non-BSc) interested in the subject
 - Minimum physics and mathematics background needed
- **Physics Minor (42 credits; 7 courses)**
 - Skills learnt in could be useful in many science and non-science fields (e.g., chemistry, economics and finance)



Physics Major

(96 credits; 2 Sci core + 6 intro + 8 advance courses)

- **Aim:** Educating all-rounded physics students which best fit their interest and expertise
- Large flexibility in curriculum, lead to diverse career paths
- **Student-centered curriculum**
 - ❖ Learn the “**physics skill set**” first:
 - ✓ *Mathematics, problem-solving, model-building, computing*
 - ❖ Follow with core courses for physics undergraduates:
 - ✓ Years 1 and 2: usage of calculus and vectors; stress daily connections
 - ✓ Years 3 and 4: formal training in physics with more abstraction and advanced mathematics

Supplementary information



Physics Major (Intensive)

(144 credits; 2 Sci core + 10 intro + 12 advance courses)

- **Aim:** Educating physics students with a solid foundation on the subject in both breath and depth
- **Targeted for students who want to pursue further studies in physics and other science/technical disciplines**
- **Two majors: Physics & Physics (Intensive)** available for students
 - ❖ Can select **either** the regular Major or the Intensive option
 - ❖ **No penalty** for students who cannot complete the Intensive option
 - ❖ All required courses for the regular Major are included in the Intensive option



Physics Related Minors

Supplementary information

- **Minor in Astronomy**

- Training on both observational and theoretical aspects
- Advanced courses in astrophysics continue to be offered to both undergraduate and postgraduate students.
- HKU continues to actively pursue **astronomical research** and **recruit postgraduate students** in astronomy.

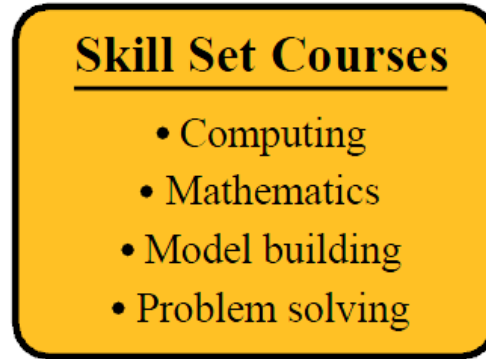
- **Minor in Physics**

- A fundamental outlook on physics, with great flexibility to explore one's interest
- Helpful for study of other science or non-science disciplines

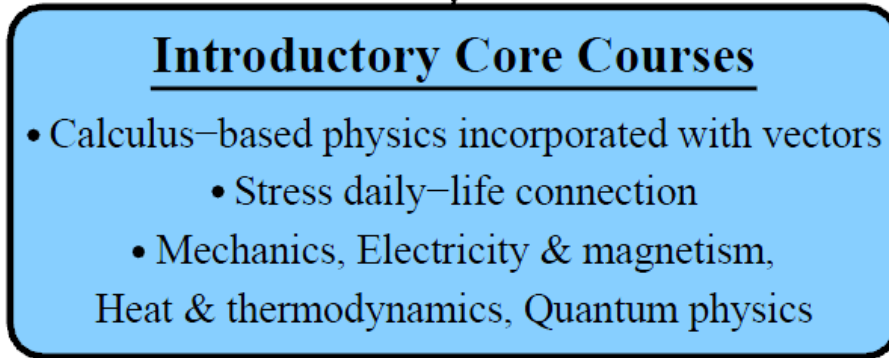


Physics Major Year 1 and 2

- PHYS 1150 Problem Solving*
- PHYS 2150 Method in Physics I*
- PHYS 2155 Method in Physics II*

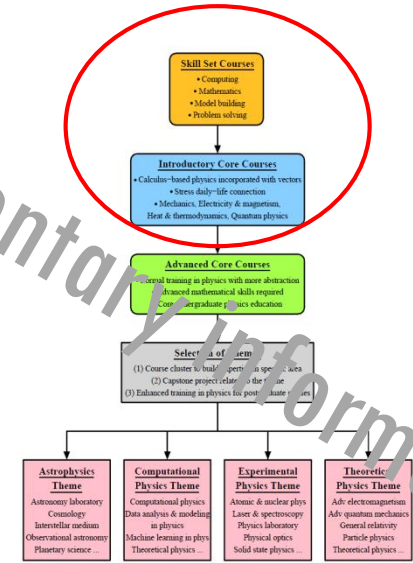


- PHYS 2055 Intro Relativity*
- PHYS 2250 Intro Mechanics
- PHYS 2261 Intro Thermal
- PHYS 2255 Intro E&M
- PHYS 2260 Intro Quantum



Required

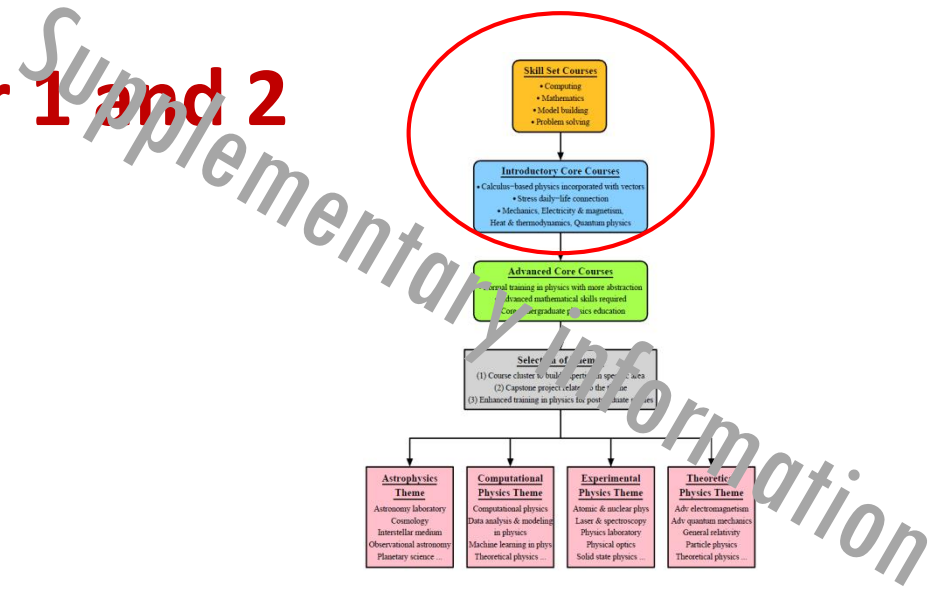
* Select 2 out of 4



Supplementary Information



Physics Major (Intensive) Year 1 and 2



- PHYS 1150 Problem Solving
- PHYS 2150 Method in Physics I
- PHYS 2155 Method in Physics II

Skill Set Courses

- Computing
- Mathematics
- Model building
- Problem solving

- PHYS 2055 Intro Relativity
- PHYS 2250 Intro Mechanics
- PHYS 2261 Intro Thermal
- PHYS 2255 Intro E&M
- PHYS 2260 Intro Quantum

Introductory Core Courses

- Calculus-based physics incorporated with vectors
 - Stress daily-life connection
- Mechanics, Electricity & magnetism, Heat & thermodynamics, Quantum physics

Required

- * Select 2 out of 6
- COMP 1117 Computer Programming
 - MATH 1013 University Mathematics II
 - PHYS 1650 Nature of the Universe
 - PHYS 2160 Intro Computational Physics
 - PHYS 2650 Modern Astronomy
 - STAT 1603 Intro Statistics



Physics Major or Physics Major (Intensive) Year 3 and 4

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

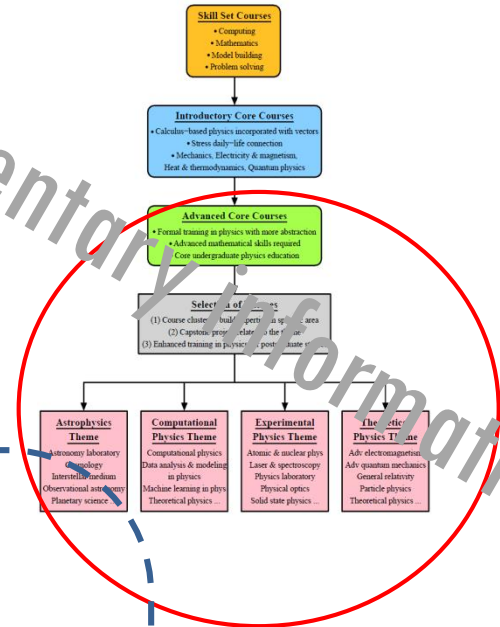
- Computational physics
- Data analysis & modeling in physics
- Machine learning in physics
- Theoretical physics ...

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 ...



Optional

Supplementary Information



Fulfilling Capstone Requirement



1. Physics Department Summer Internship program (PHYS4966): 6 credits

Requirement: 8 weeks in academic and non-academic institutions overseas or locally during summer

Local research: Spending summer to work with HKU professors

Overseas research: Princeton, Cambridge, Harvard, Stanford, ETH Zurich, Oxford, UC Berkeley, RIEKN, UCLA, CERN, Caltech, ...

Local organizations: 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 Assisi College, Yu Chun Keung No 2 Memorial College, ...

2. Directed Studies in Physics (PHYS3999): 6 credits

3. Physics Project (PHYS4999): 12 credits

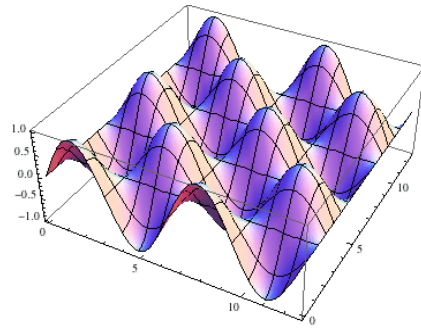


Four (*optional*) themes for Physics or Physics(Intensive) majors

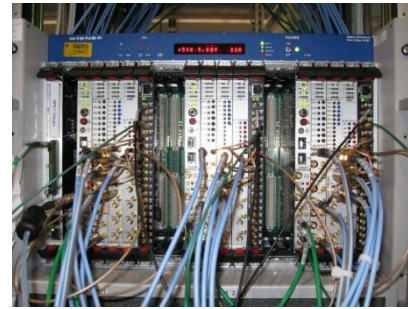
- **Optional** for students (may choose 0, 1 or 2 themes)



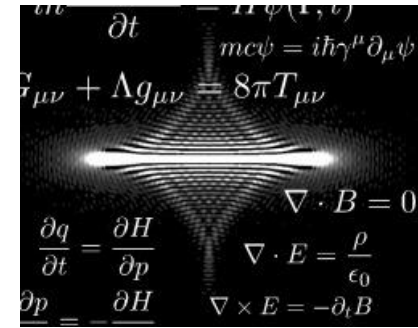
Astrophysics



**Computational
Physics**



**Experimental
Physics**



**Theoretical
Physics**

- Help students to **build expertise** in specific areas
- Enhanced training to prepare for postgraduate studies
- Student **strength endorsed** by the Department with certificate of completion (*will also be a factor in HKU physics postgrad admission consideration*)



Studying astronomy in HKU



- If I want to study astronomy, should I select the
Minor in Astronomy?
Major in Physics (Intensive) with Astrophysics theme?
Major in Physics - Minor in Astronomy combination?
 - The **Minor in Astronomy** is suitable for science or non-science students with *minimal physics and mathematics requirements*
 - If you want to pursue postgraduate research in astronomy, then EITHER **Major in Physics (Intensive) with Astrophysics theme** OR **Major in Physics - Minor in Astronomy combination** are good



Why Physics @ HKU?



- **Faculty with diverse research interest**

Broad range of courses taught by expert staff on that topic; Outside experts invited to offer specialty courses

- **Outstanding track record on research**

Many channels for students to get involved, e.g. research project courses, Summer Research Fellowship

- **A friendly learning environment**

Small class size; *Low student-to-teacher ratio (lower than 6:1)*

- **Long standing tradition of rigorous physics training**

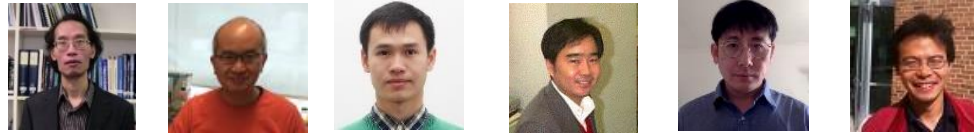
Alumni network in business, education, government and academia



Research Areas

➤ Research Areas of professoriate staff:

Atomic, Optical and Quantum Physics



Astronomy and Astrophysics



Experimental Condensed Matter and Material Science



Theoretical and Computational Condensed Matter Physics



Experimental Nuclear and Particle Physics





Why Physics @ HKU?



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Broad range of courses taught by expert staff on that topic; Outside experts invited to offer specialty courses

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- **Long standing tradition of rigorous physics training**

Alumni network in business, education, government and academia



Outside Classroom Learning Opportunities

Overseas Summer Research Fellowship (8 weeks during summer)

Participants engage in research field of their own choosing;
Physics Department **match student's interest with researchers**



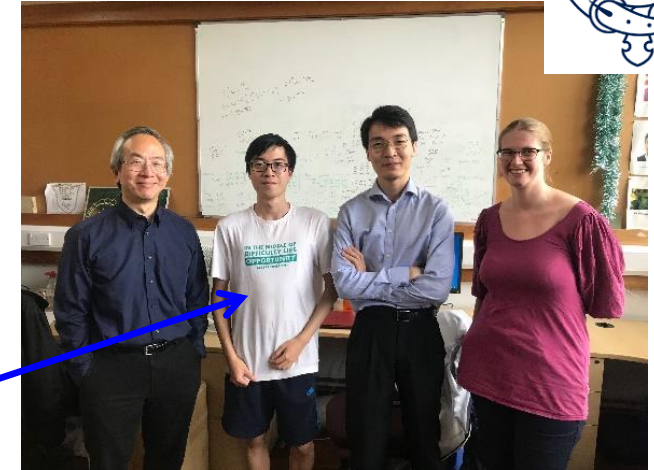
2019 summer



Marco Yeung (experimental nuclear physics) with Prof Shunji Nishimura, **RIKEN**

Kelvin Tsang (experimental particle physics) Prof Jeff Tseng, **Oxford**

Zhao Qingqing (computational condensed matter physics) Prof Owen Miller, **Yale**



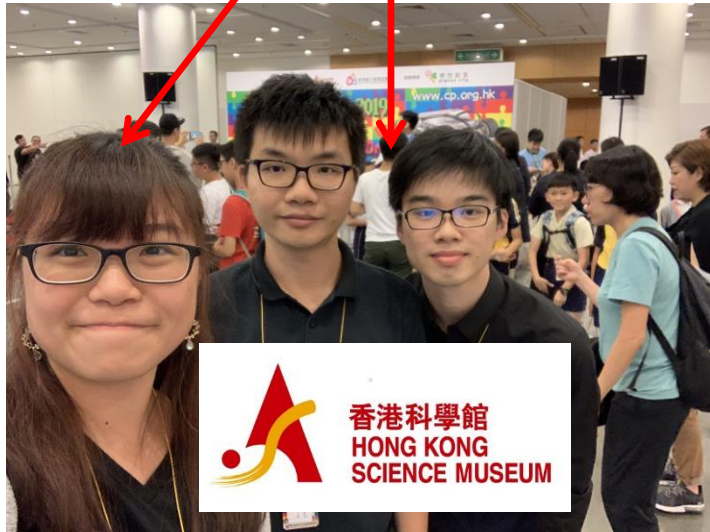


Outside Classroom Learning Opportunities

Summer Internship (8 weeks during summer)

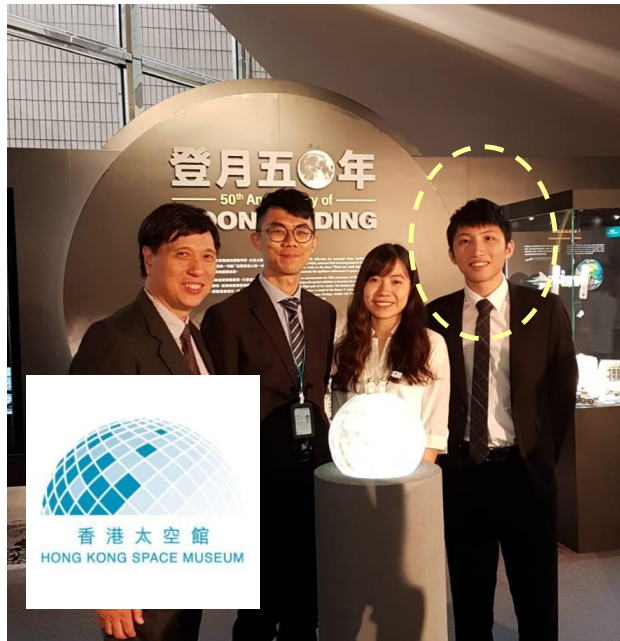
Participants engage in actual work to apply their book knowledge

*Elizabeth Kwok &
Jason Siu (HK
Science Museum)*



2019 summer

*Leo Lee (HK
Space Museum)*



*Keith Tse & Billy Chu
(Ho Koon
Astronomical Centre)*





Outside Classroom Learning Opportunities

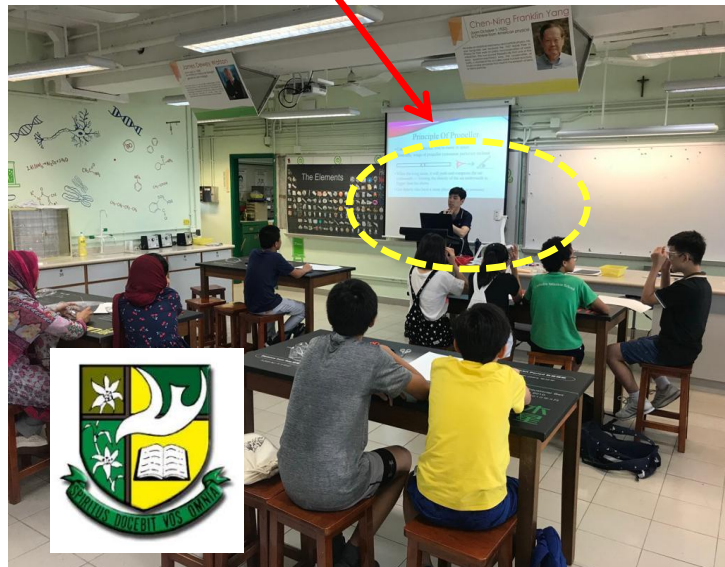
Summer Internship (Secondary Schools)

8 weeks during summer

Participants get first-hand experience working both in and out of classroom settings

2019 summer

Anthony Chow (Yu Chun Keung No 2 Memorial College)



Leung Cheuk Yin (St Joseph Anglo-Chinese School)



Kenny Fan (Cheung Sha Wan Catholic Secondary School)





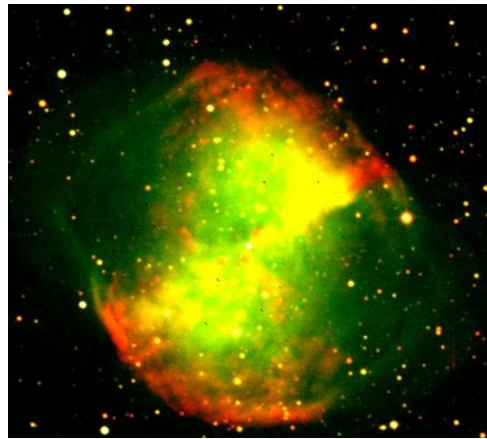
Outside Classroom Learning Opportunities

Undergraduate Overseas Experiential Learning (1-2 weeks)

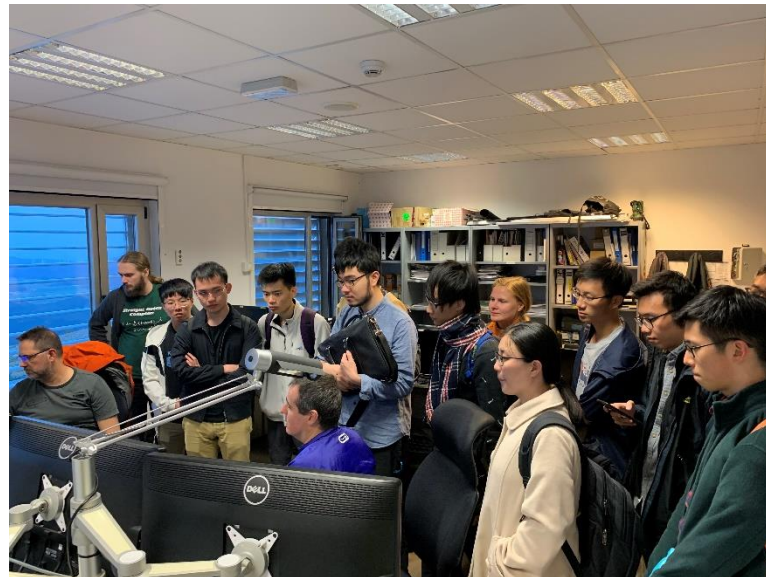
Summer School on Observational Astronomy (Summer 2019)

Lectures and hands-on projects

CEFCA (Teruel, Spain)



12 HKU undergraduates
who have taken advanced
Astronomy courses





Outside Classroom Learning Opportunities

Undergraduate Overseas Experiential Learning (1-2 weeks)

Summer School on Nuclear Physics at RIKEN (2016, 2017, 2018, 2019)
Together with Peking University & Seoul National University



Nishina School at RIKEN
(Tokyo, Japan)



5 HKU undergraduates who took nuclear physics course and training





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 Hong Kong 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



Thank you!

**Please contact us at physdept@hku.hk
for inquiries**

**HKU Department of Physics homepage:
<http://www.physics.hku.hk/>**