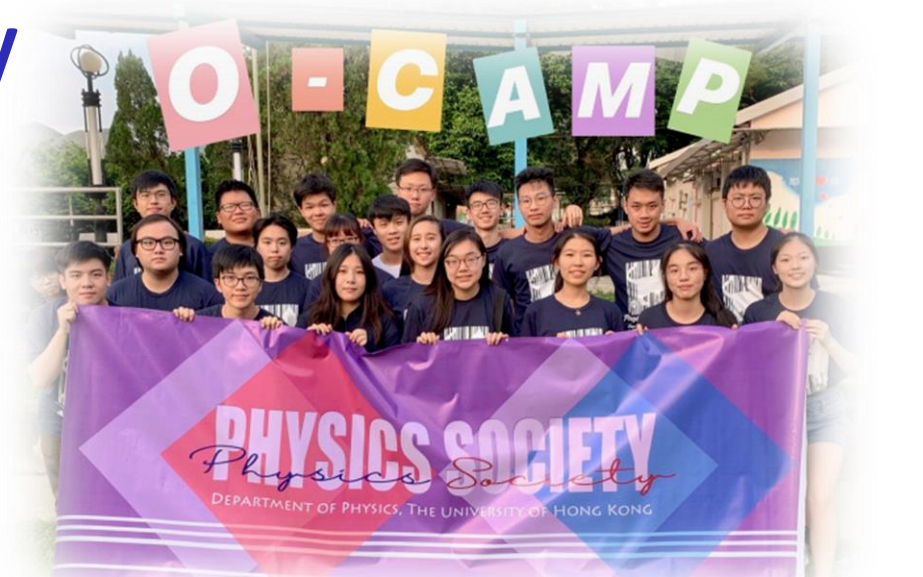




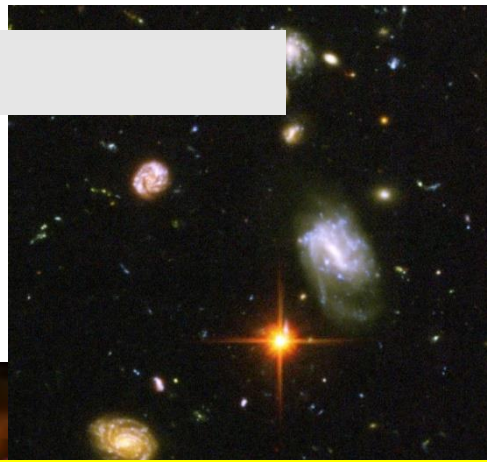
**Major in Physics**  
**Major in Physics (Intensive)**

**Minor in Physics**  
**Minor in Astronomy**

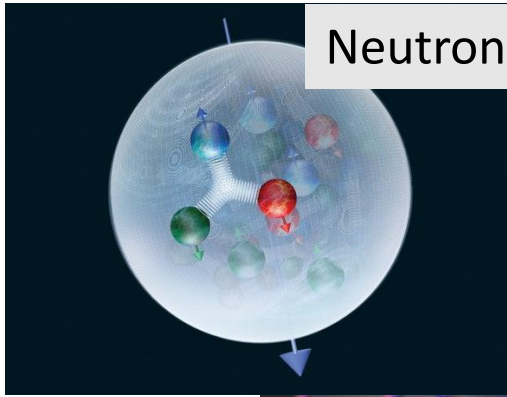




Galaxies

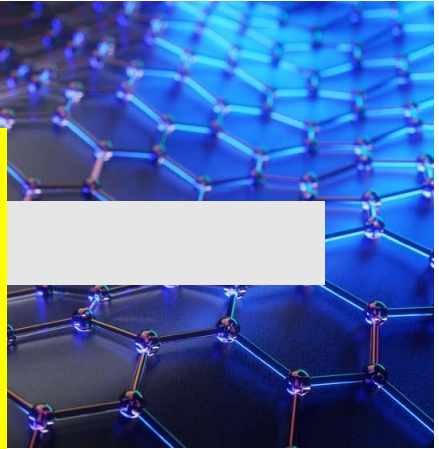


Neutrons



Sun-Earth

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



Ocean wave



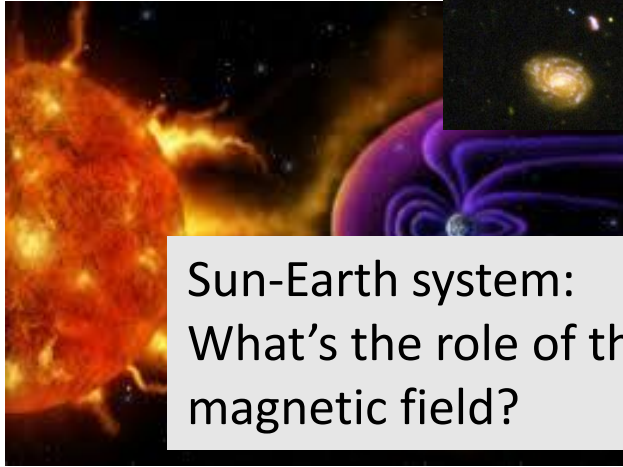
Hummingbird



E.Coli bacteria



Galaxies:  
What caused galaxies to have different shapes?

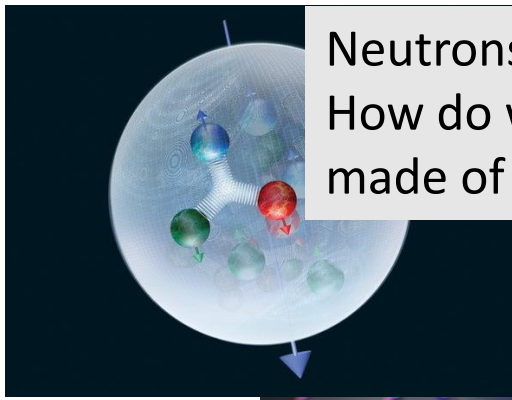


Sun-Earth system:  
What's the role of the Earth's magnetic field?

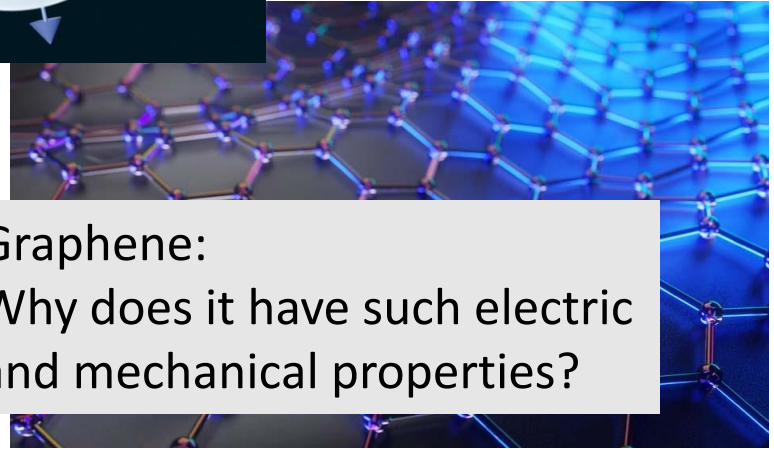
Ocean wave:  
How do these waves affect the Earth's temperature?



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



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



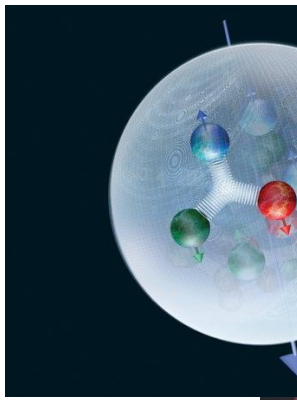
Graphene:  
Why does it have such electric and mechanical properties?



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



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



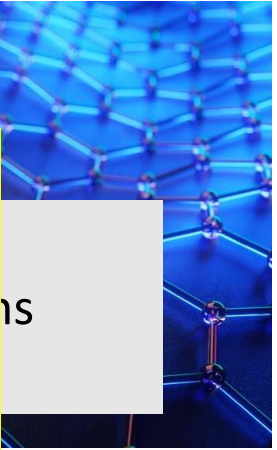
Neutrons:  
Why neutron weighs much more than its three quarks?



Sun  
Wh  
ene

# Why Physics?

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



ns

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



Hummingbird:  
What dictates their bright colors?

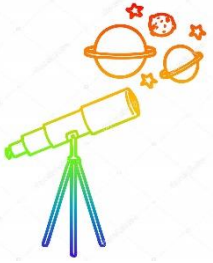
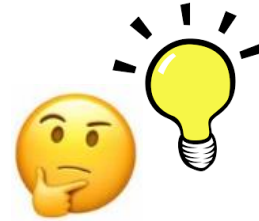


E.Coli bacteria:  
Why some E.coli were so harmful to human?



# 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

Supplementary information





# 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

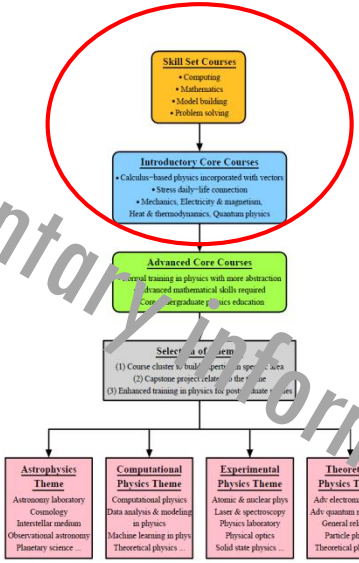
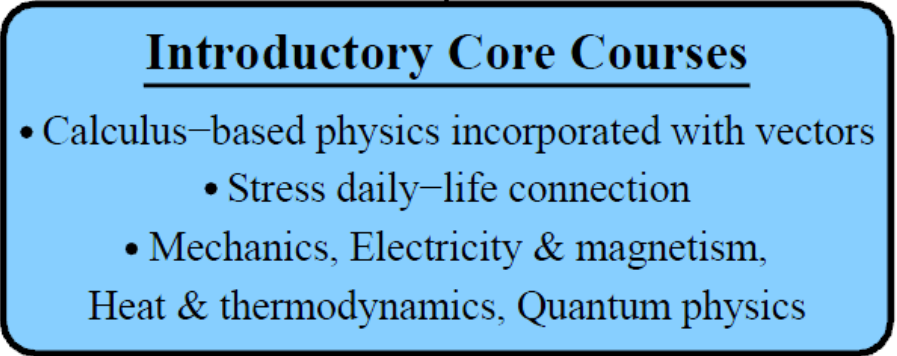
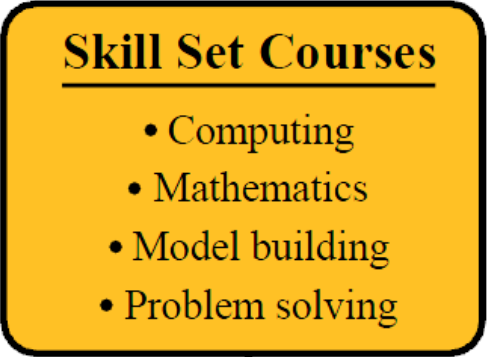


# Physics Major Year 1 and 2

- PHYS 1150 Problem Solving\*
- PHYS 2150 Method in Physics I\*
- PHYS 2155 Method in Physics II\*
- PHYS 2160 Intro Compu Physics\*

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

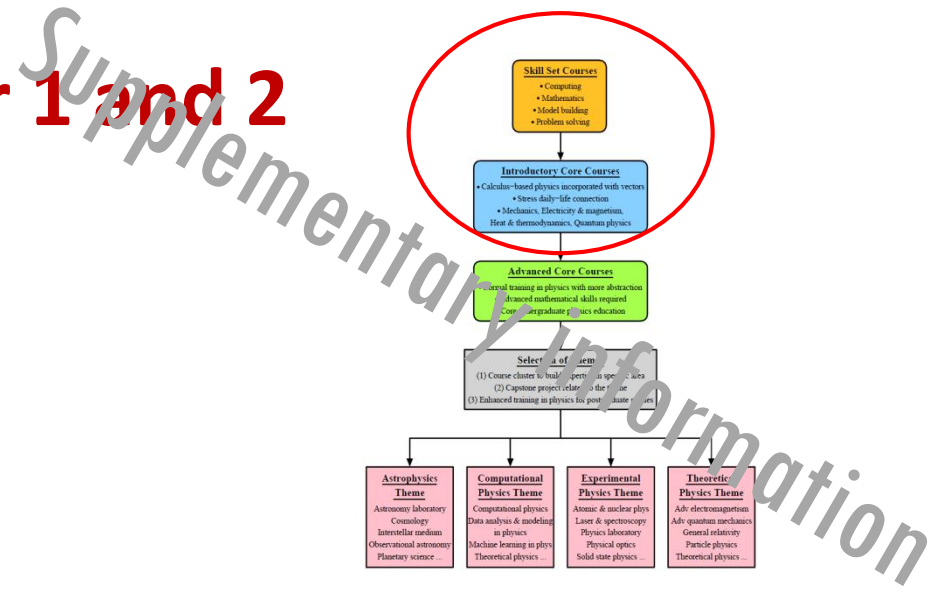
Required



\* Select 2 out of 5



# 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

Optional

**Astrophysics Theme**

- Astronomy laboratory
- Cosmology
- Interstellar medium
- Observational astronomy
- Planetary science ...

**Computational Physics Theme**

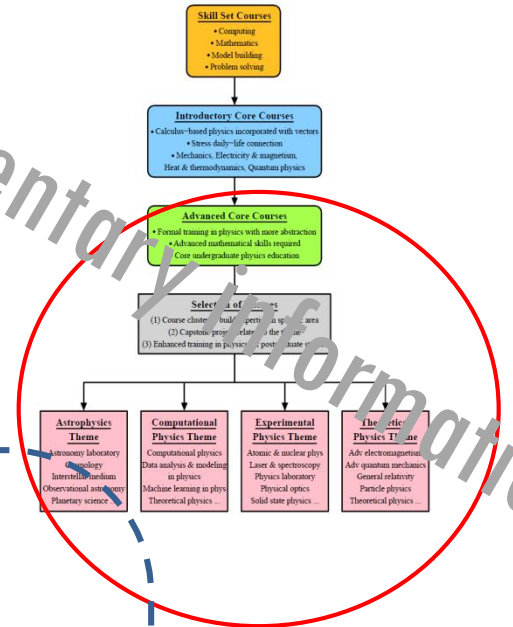
- Computational physics
- Data analysis & modeling in physics
- Machine learning in physics
- Theoretical physics ...

**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 ...





# 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

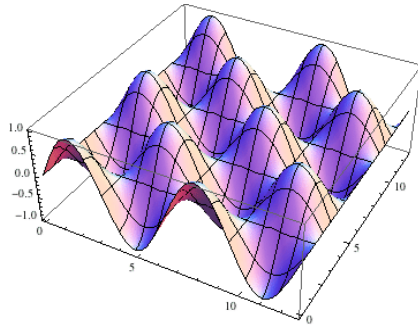


# Four (*optional*) themes for Physics or Physics(Intensive) majors

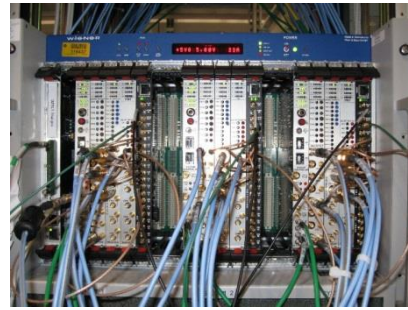
- **Optional** for students (may choose 0, 1 or 2 themes)



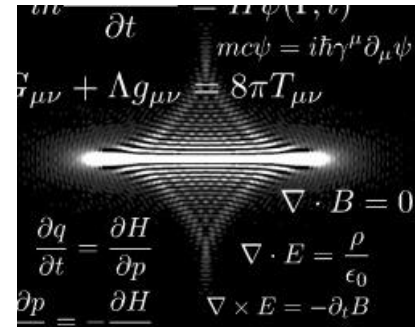
**Astrophysics**



**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



Details of courses of Physics Major can be found at the web site:

<https://webapp.science.hku.hk/sr4/servlet/enquiry?Type=Major&Code=MajorInPhysics&AdmissionYear=2022>

Details of courses of Physics Intensive Major can be found at the web site:

<https://webapp.science.hku.hk/sr4/servlet/enquiry?Type=Major&Code=MajorInPhysicsIntensive&AdmissionYear=2022>





# 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:

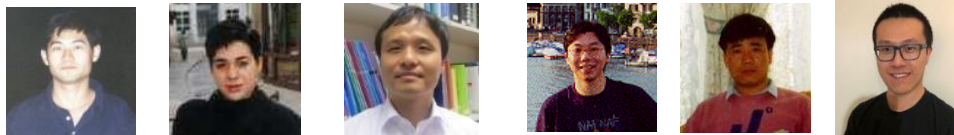
### Atomic, Optical and Quantum Physics



### 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

- **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



# 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**



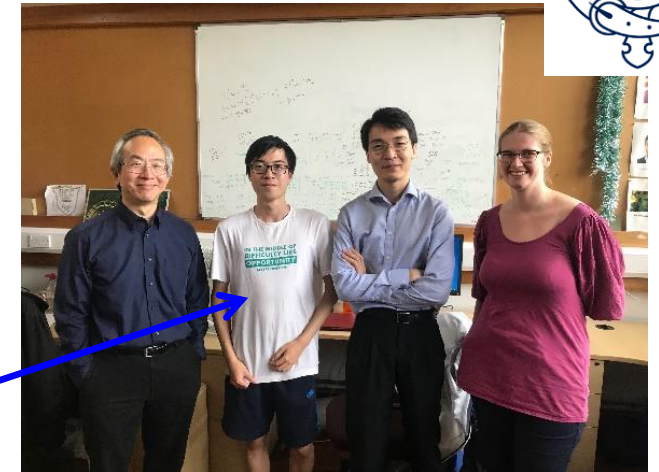
### 2019 summer



*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)

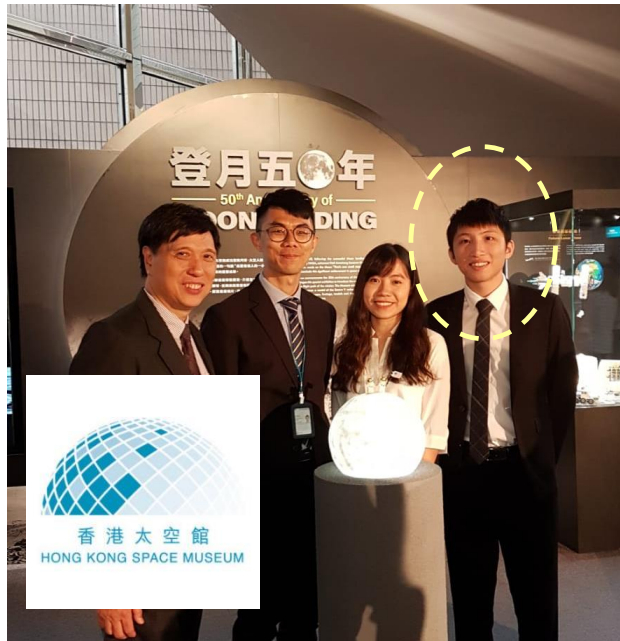
Participants engage in actual work to apply their book knowledge

*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

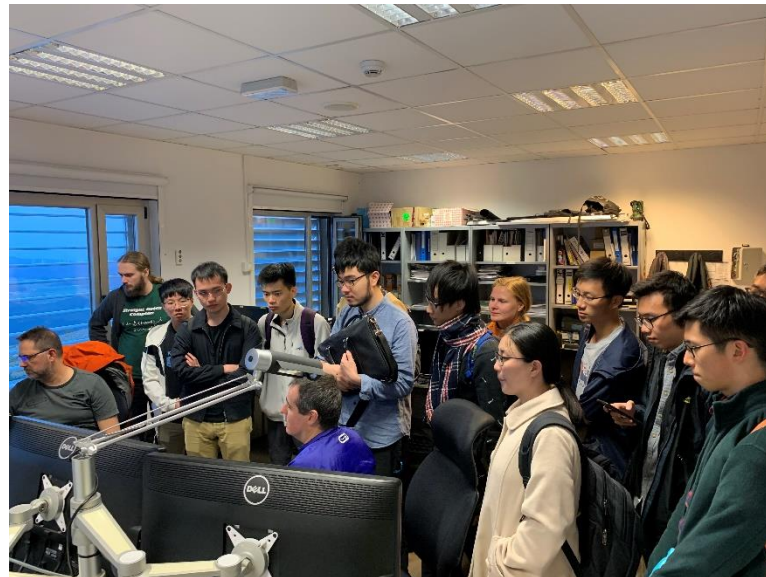
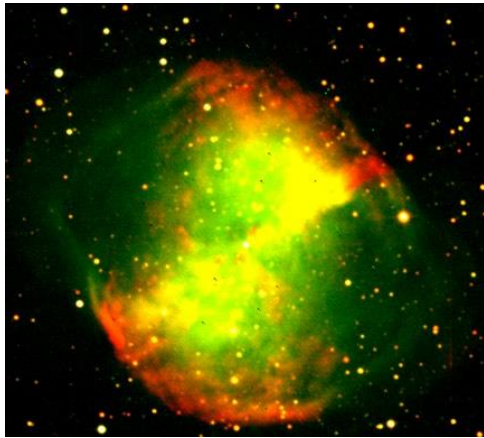
## Undergraduate Overseas Experiential Learning (1-2 weeks)

### 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







Government:



# Career Prospects

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](mailto:physdept@hku.hk)  
for inquiries**

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