

# Admission talk for 2023 Physics @ CUHK

(JUPAS 4601 CUHK Science (大類收生)-> Physics major)

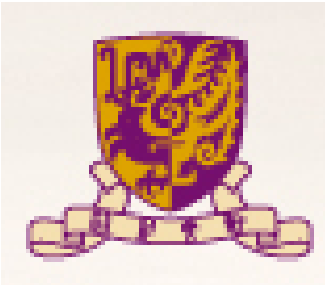
(JUPAS 4690 Enrichment Stream in Theoretical Physics 理論物理精研)

Department of Physics

JUPAS hotline

Email: [ugadm@phy.cuhk.edu.hk](mailto:ugadm@phy.cuhk.edu.hk)

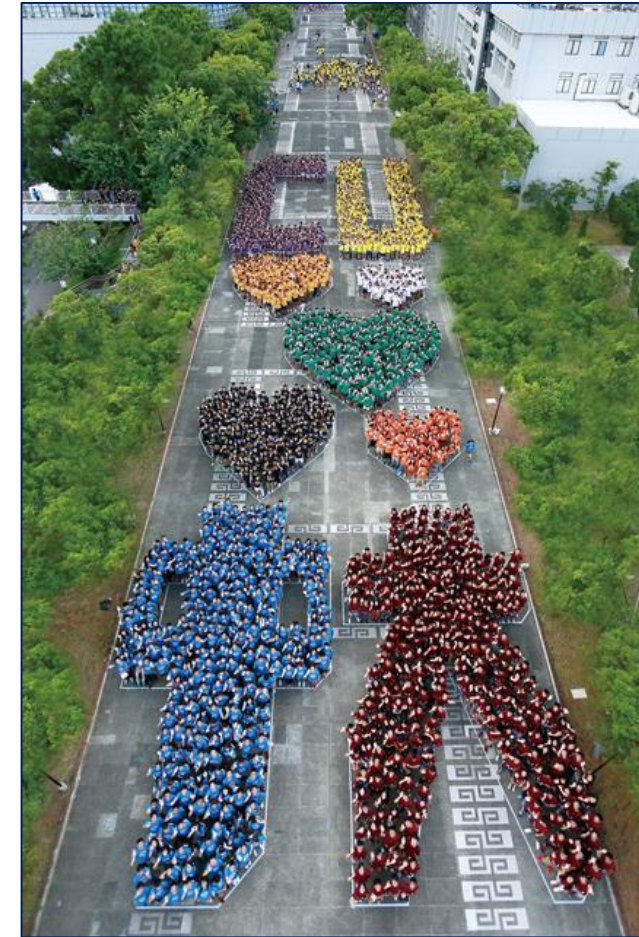
Tel: (852) 3943-6154



# The Chinese University of Hong Kong 香港中文大學



未圓湖及獅子亭



百萬大道



- A comprehensive university founded 1963 as a federation of Chung Chi (崇基), New Asia (新亞) and United (聯合) Colleges 書院.
- Currently, 9 colleges 書院 and 9 faculties/schools 學院 (Arts 文學, Business 工商管理, Education 教育, Engineering 工程, Law 法律, Medicine 醫, Science 理, Social Science 社會科學 and Graduate School 研究院).



# Department of Physics 物理系

- Founded more than 50 yrs. One of the oldest in CUHK.
- 11 Professors 教授, 5 Associate Professors 副教授, 9 Assistant Professors 助理教授, 4 Research Assistant Professors 研究助理教授, and 5 Senior Lecturers/ Lecturers 講師  
→ 34 faculty members



You may want to study physics if you want to:

- know how Nature works: **From the atom to the universe**
- become a **scientist** 科學家, a **physics professor** 物理教授, a **science teacher** 理科老師, an **engineer** 工程師, a **financial analyst** 金融分析師, .....
- or even start your own innovative technology company 科技初創公司

CUHK Physics is the place for you because **we care very much about teaching** 非常關心教學

CUHK Physics has a **very good reputation** 優良聲譽 that **we are very serious in education**

Therefore, we provide a **rigorous curriculum** 嚴謹課程 that helps you to build a solid foundation

The curriculum may **not be as easy as you think** but we try our best to ensure “**位位皆尖兵**”



- We have been nurturing over **2000 physics students** over 50 years
- In recent years, over **50%** of graduates move on to study **PhD in top schools** around the world with **full financial support** 全資助

2021	2020	2019	2018
U. of Cambridge	U. of Chicago	Caltech	Caltech
Duke U.	Duke U.	U. of Chicago	U. of Chicago
U. of Toronto	UIUC	U. C. San Diego	UIUC
ETH Zurich	U. of Wisconsin	U. of Washington	Brown U.
Johns Hopkins	Maryland	U. of Michigan	Notre Dame U.
Ohio State U.	U. British Columbia	U. British Columbia	Ohio State U.
UIUC	U. of Colorado	ETH Zurich	U. C. San Diego

- More than **50** are professors at local and oversea universities
- More than **200** graduates have become physics teachers

# Student achievements

- Every year, we have students awarded the **Innovative and Technology Scholarship 創新科技獎學金** (\$150,000). Placed at the best of the best students in HK.
- **More than 35%** students have been awarded CN Yang scholarships, Undergraduate Research Experience Grant, Chung Chi Scholarship for Excellence, Physics Prize, Admission Scholarship, 1967 Alumni Scholarship, .....
- They have been awarded from more than **2000 scholarships and prizes** covering **tuition fee 學費** and **living expense 生活費**.
- Students won the international robotics contests 機器人大賽, data and computational competitions 編程大賽 .....



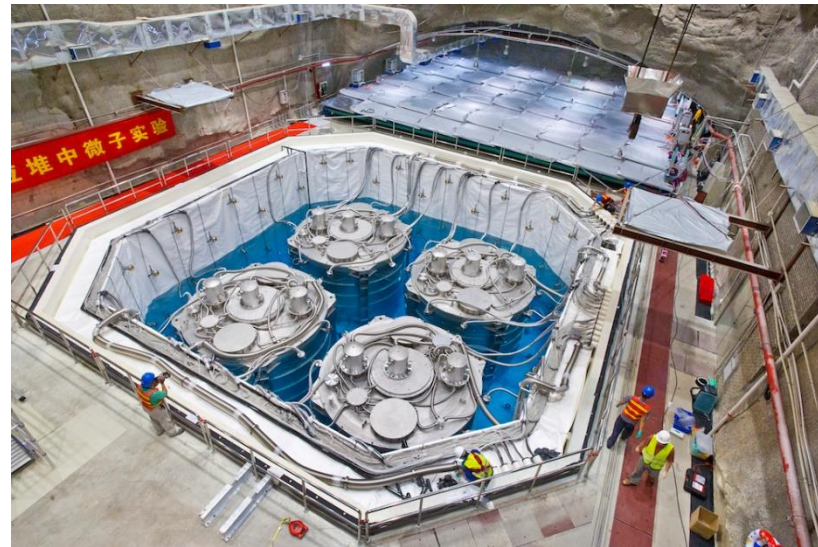
- Participated in **large-scale international research projects** 大型國際研究項目

High energy physics at CERN 歐洲核子研究中心

LIGO for measuring gravitational waves 重力波



Astrophysics 天體物理



Daya Bay for studying neutrinos 中微子

- **Published research papers** in high-impact journals.

# Physics at CUHK: Curriculum 課程 Overview

- University Physics (1<sup>st</sup> and 2<sup>nd</sup> years)
- Classical Mechanics 經典力學 (2<sup>nd</sup> and 3<sup>rd</sup> years)
- Quantum Mechanics 量子力學 (3<sup>rd</sup> and 4<sup>th</sup> years)
- Electromagnetic theory 電磁理論 (3<sup>rd</sup> and 4<sup>th</sup> years)
- Thermal and Statistical Physics 熱物理和統計物理 (3<sup>rd</sup> and 4<sup>th</sup> years)
- Mathematical Skills 數學技能 (1<sup>st</sup> – 3<sup>rd</sup> years)
- Experimental Skills 實驗技能 (1<sup>st</sup> – 3<sup>rd</sup> years)
- Computational Skills 計算能力 (2<sup>nd</sup> and 3<sup>rd</sup> years)
- Other electives (3<sup>rd</sup> and 4<sup>th</sup> years)

47 (Science)/57 (ESTP) compulsory units and 24/15 elective units out of 123 total units

## Enrichment Stream in Theoretical Physics 理論物理精研

- For **elite 精英** students who are talented in physics and mathematics (**top 10 program in CUHK**)
- Provide a solid foundation on theoretical physics and mathematics
- Provide more **project learning** and **research opportunities**
- More **small-group discussion** classes
- **Guaranteed 保證 research opportunities** at an earlier stage
- **Critical mass 凝聚** of very good students love physics



# Learning opportunities beyond classroom

## **SURE – Summer Undergraduate Research Exchange**

Cambridge, Oxford, Caltech, CERN, LIGO, Chicago, Toronto, ....

## **OPUS – Overseas Program for Undergraduate Students**

Berkeley, Fudan

## **STAR – Summer Teacher Apprenticeship**

Local secondary schools

## **Internships**

Summer Research Internship, HK observatory, Space Museum, Science Museum

## **Exchange programs**

University and colleges

## **Co-op programs**

More than 75 companies participate

- **More than 35%** of students participate the Summer Research Internship 暑期研究實習 in their **1<sup>st</sup> and 2<sup>nd</sup> years** with financial support
- **More than 30-40%** of students join oversea exchange program, local teaching assistant, and other internships such as HK observatory, Science Museum in **2<sup>nd</sup> and 3<sup>rd</sup> years**
- **More than 40%** of students join the college or university exchange programs
- **All students** spend **at least one semester** in conducting research

# Science 大類收生 (JS 4601)

## 4 Core Subjects 核心科目

Level 3 in Chinese and English

Level 2 in Mathematics and Liberal Studies

- Best 5
- Declare Physics as major programme after admission into CUHK Science

## 2 Elective Subjects 選修科目

1st - Level 3 in any ONE subject from Biology / Chemistry / Physics / M1 or M2 / Combined Science or Integrated Science

2nd - Level 3 in any ONE subject in Category A 甲類科目

## Some subjects with Heavier Weighting 比重

2.0X Biology, Chemistry, Physics, Mathematics, M1 or M2, Combined Science or Integrated Science

1.5X Chinese OR English, Economics, Geography, Information and Communication Technology, Technology and Living (Food Science & Technology)

(A maximum of 3 subjects will be weighed heavier)

## Bonus Point Arrangement

6th and 7th subjects in Category A or Category C

Outstanding performance in interview 面試

School Principal's Nominations (SPN) 校長推薦計劃



# 理論物理精研 (JS 4690)

## 4 Core Subjects

Level 3 in Chinese and English

Level 4 in Mathematics

Level 2 in Liberal Studies

- Best 5
- Direct admission to CUHK Physics via JUPAS

## 2 Elective Subjects

1st - Level 4 in Physics

2nd - Level 3 in any ONE subject from M1 or M2 (preferred) / Biology / Chemistry / Combined Science or Integrated Science / Economics / Geography / Information and Communication Technology / Technology and Living (Food Science & Technology)

## Some subjects with Heavier Weighting

HKDSE Subject	Physics	Mathematics and M1/M2	Subjects in Category A*	English/Chinese Language	Liberal Studies and Others
Weighting factor	<b>× 2</b>	<b>× 1.5</b>	<b>× 1</b>	<b>× 1</b>	<b>× 1</b>

- Extra Bonus Points will be given to
  - ✓ 5\*\* in HKDSE Physics, Mathematics & M1/M2
  - ✓ Outstanding performance in interviews 面試 (~ May 2023)
  - ✓ 6th and 7th subjects in Category A
  
- JUPAS Quota: **20**

# JUPAS Admission Score 2022 (理論物理精研)

Admission Figures	CHI	ENG	MATH	LS	M1/M2	PHY	Sci	Best 5
Upper Quartile	4	5*	5*	4	5*	5**	5*	31
Median	4	4	5*	4	5	5*	5*	27
Lower Quartile	4	4	5**	4	5	5*	4	26

We are constantly placed at the top 10 program in CUHK



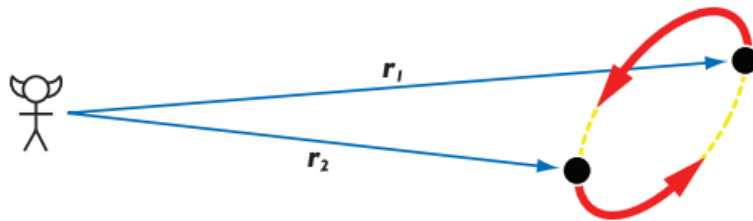
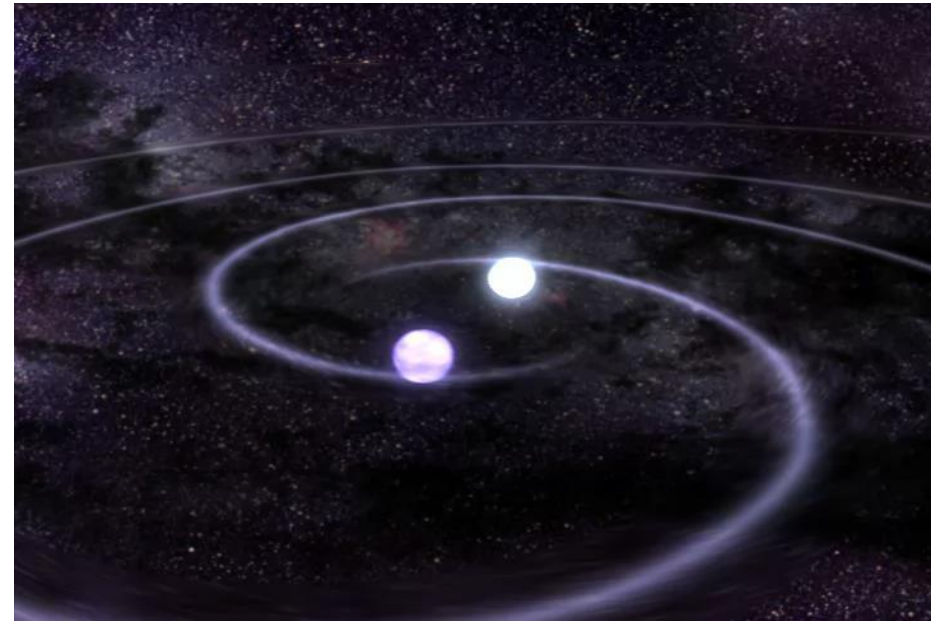
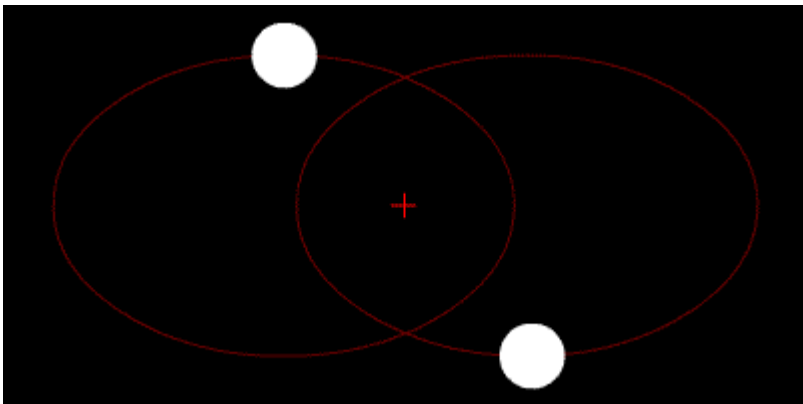
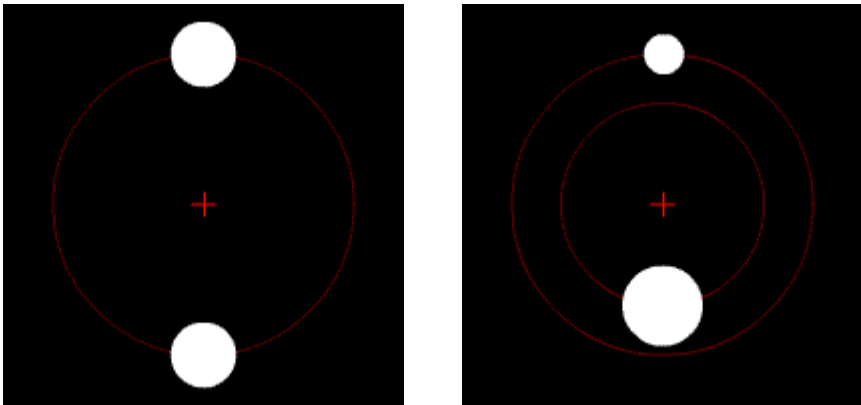
# The STEM Talent Scheme

- “3 or more stars with lowest level 3 or above” (e.g. 5\*5\*5\*, 5\*\*5\*3, 5\*\*5\*\*5\*\*, ...) in 3 STEM-related elective subjects# 三科 STEM 選修科目# 中考獲最少三粒星
- For 理論物理精研 (JS4690), **Physics** must be one of the 3 STEM-related elective subjects
- Put the science program in **higher priority** 高優先
- Good for those who satisfy the above criteria but fail to fulfill the minimum requirement in the 4 core subjects (3322) by one level in any one subject
  - ◆ Programs will consider their applications and offer interviews to the potential applicants
  - ◆ The application results will be announced as Main Round offer results 正式遴選結果 by JUPAS

#Biology, Chemistry, Physics, Mathematics Extended Module I/II, Combined Science, Integrated Science, Information and Communication Technology, Design and Applied Technology

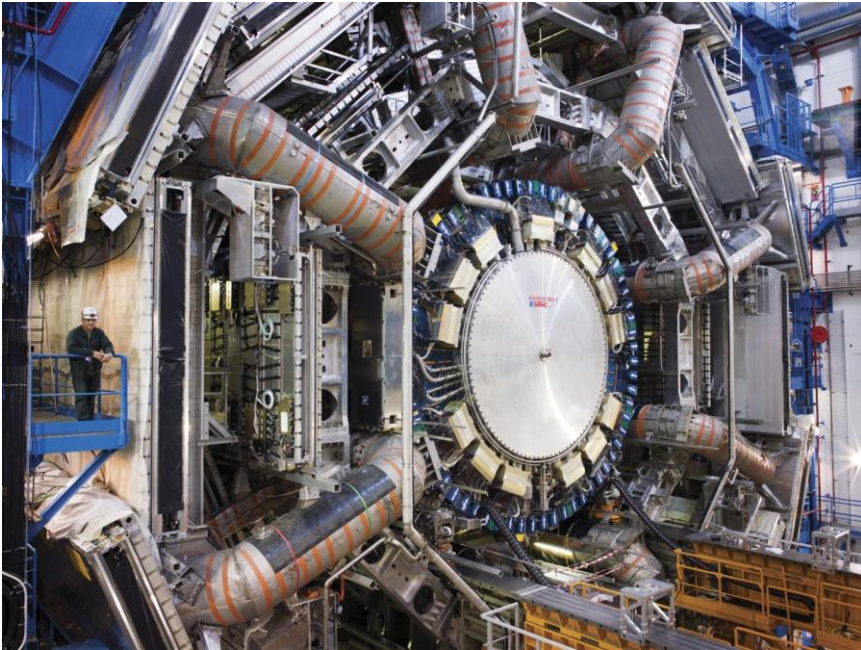
# What will you do?

- Gravitational wave (重力波) and black hole
- Massive objects like neutron stars (中子星) or black holes orbiting around each other at ever increasing rates, or stars that blow themselves up



- High energy physics

- Study the Higgs boson (上帝粒子) 是標準模型裏的一種基本粒子，是一種玻色子，自旋(spin)為零，宇稱為正值(even parity)，不帶電荷(zero charge)、色荷，極不穩定，生成後會立刻衰變 (decay)

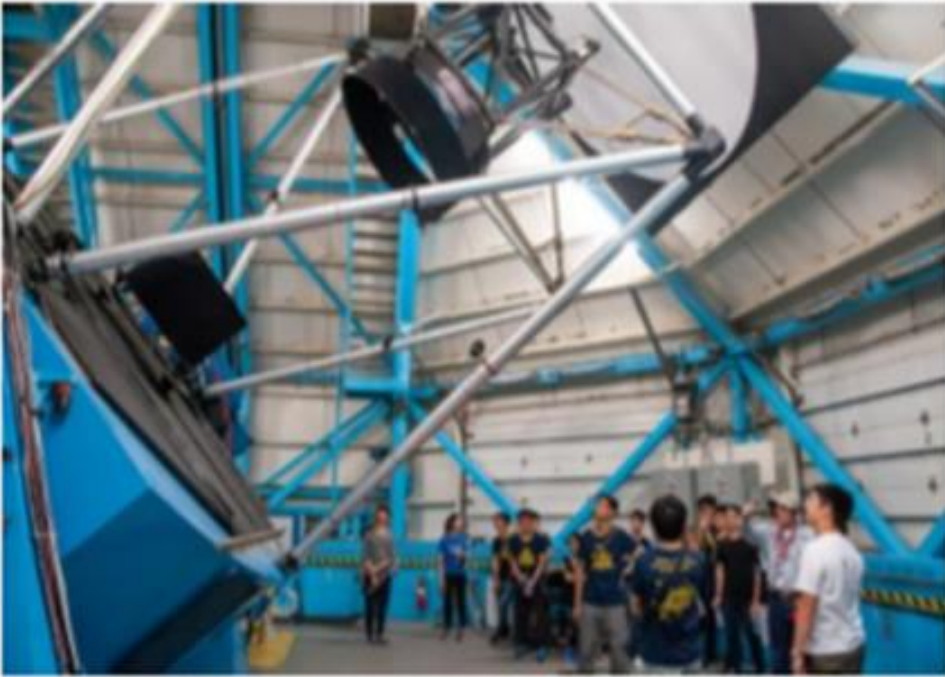


Large Hadron Collider (對撞粒子加速器)  
at CERN

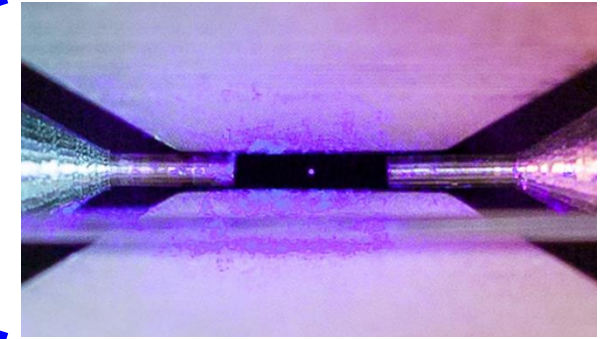
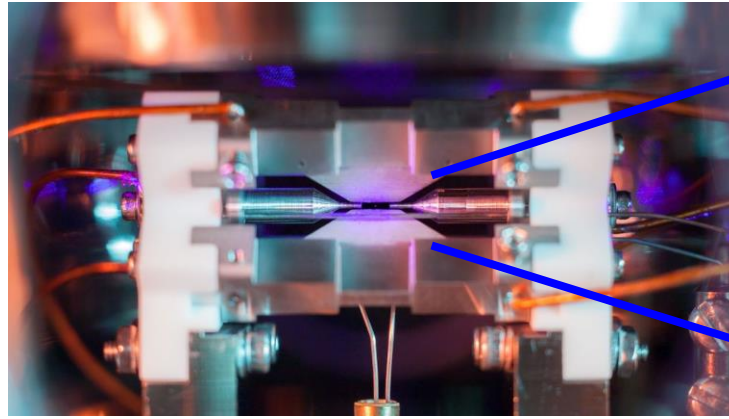




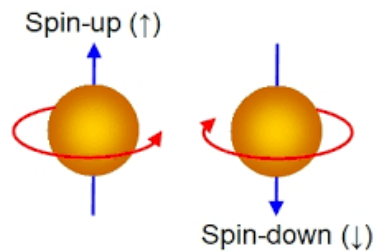
- Astrophysics
- Study dark matter (暗物質): approximately 85% of the matter in the universe
- Study star formation, planet formation and galaxy evolution



- Quantum phenomena
- Trap atoms and molecules

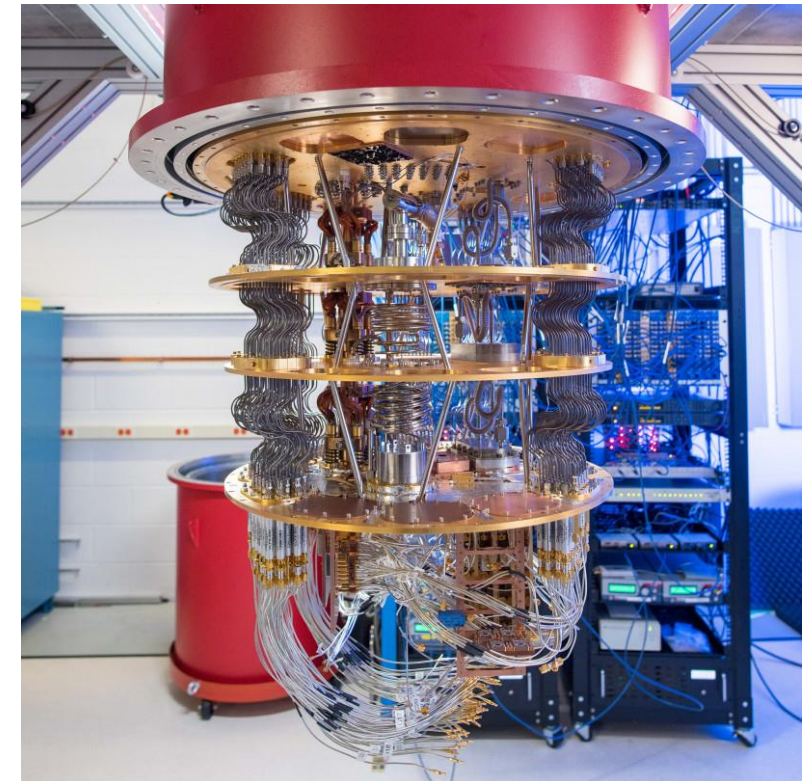


- Study quantum computer and information



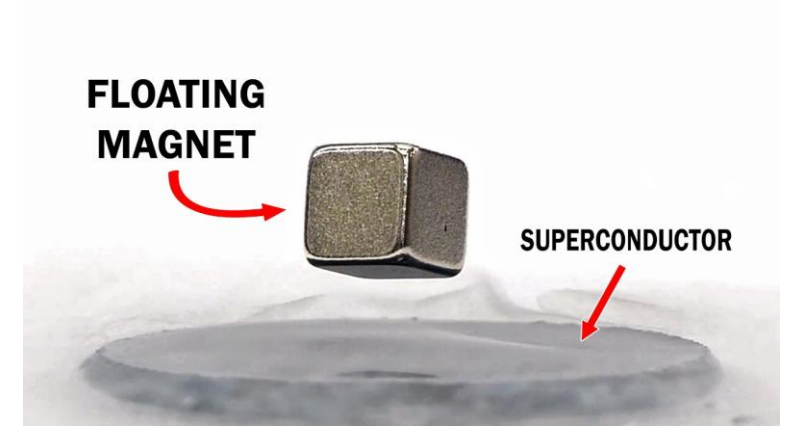
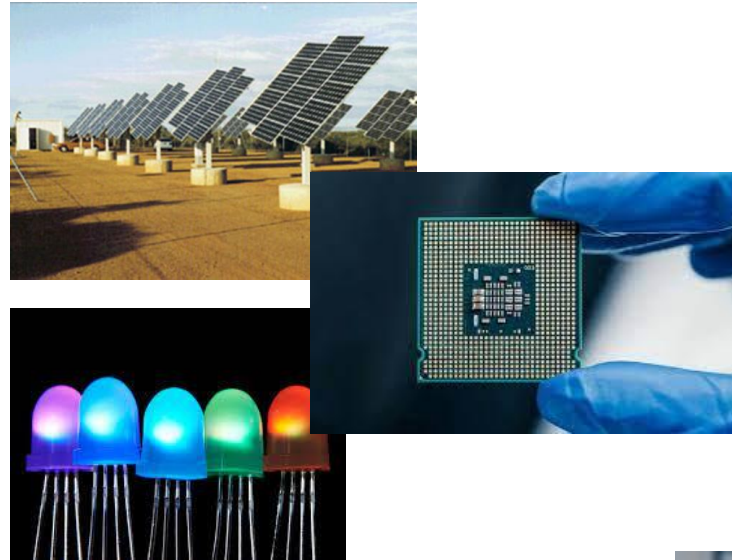
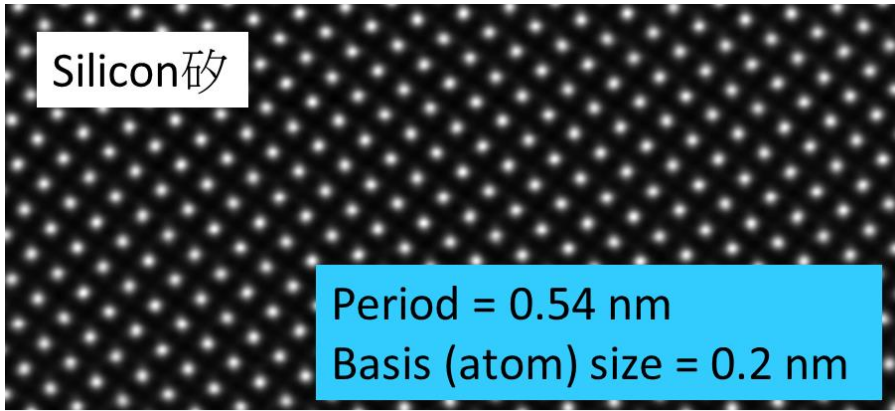
- Quantum entanglement (量子纠缠)

當幾個粒子在彼此相互作用後，由於各個粒子所擁有的特性已綜合成為整體性質，無法單獨描述各個粒子的性質，只能描述整體系統的性質。

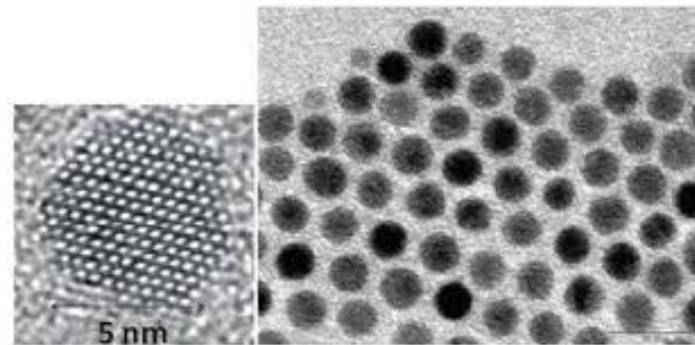
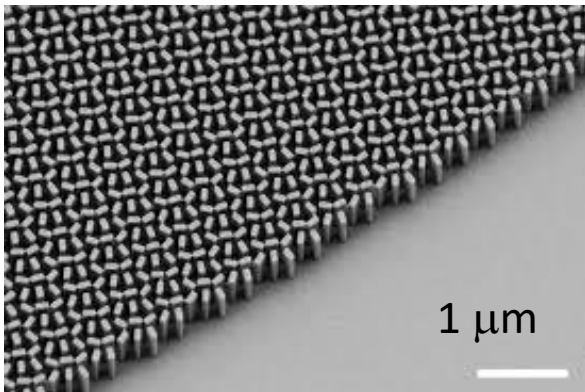




- Electron, optical, mechanical waves in solids and artificial structures
- Electronic crystals: semiconductor superconductors

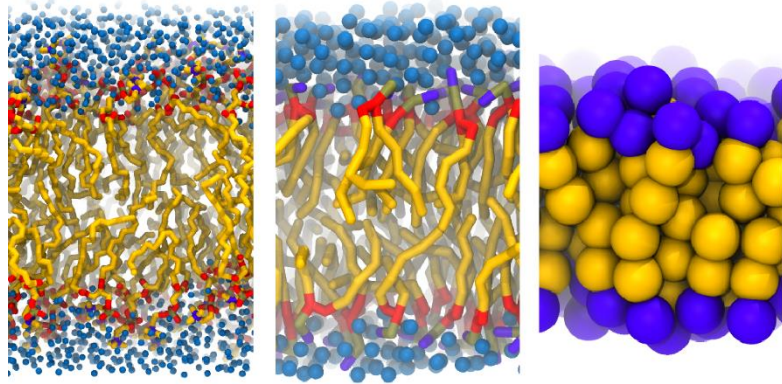


- Photonic structures

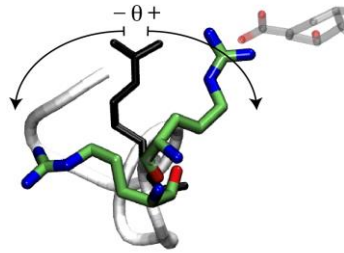
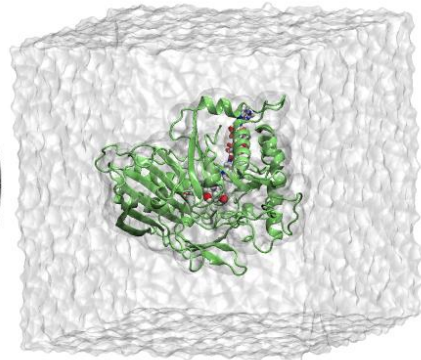
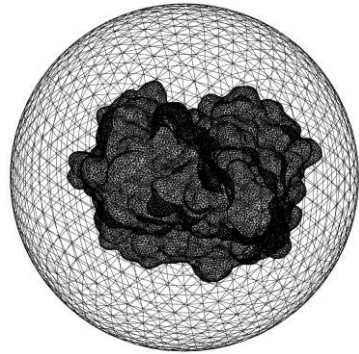
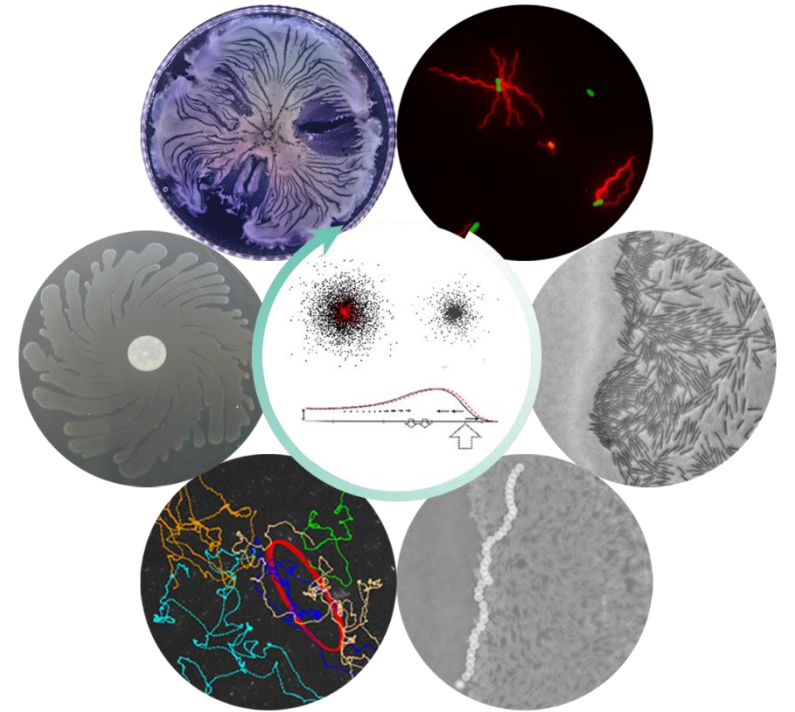


- Physics of biological macromolecules and living matter
- Computer simulations of proteins and other biological macromolecules

計算機模擬研究蛋白等生物大分子的結構與功能

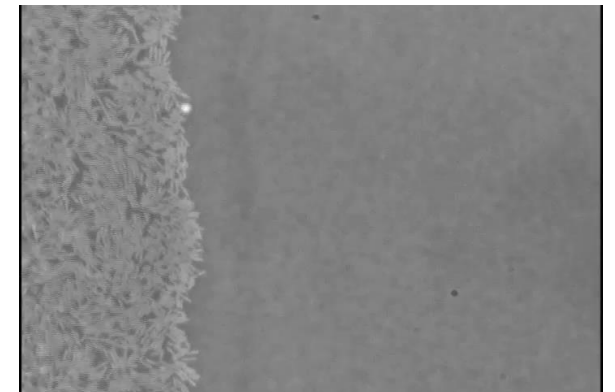


$$H = \int dS \left[ \frac{1}{2} k_c (H - C_0)^2 + k_G K \right] + \frac{1}{2} k_A \frac{(A - A_0)^2}{A_0} + 2\pi\lambda\gamma_p$$



- Bacterial motility, collective motion, and self organization

生物物理實驗研究細菌等活性物質的運動和自組織



# More Information

Undergraduate Admission Inquiry: [ugadm@phy.cuhk.edu.hk](mailto:ugadm@phy.cuhk.edu.hk)

Physics Curriculum Inquiry: [physics@phy.cuhk.edu.hk](mailto:physics@phy.cuhk.edu.hk)

Physics Department Webpage: <http://www.phy.cuhk.edu.hk>

Science Faculty Webpage: <http://www.sci.cuhk.edu.hk/>

