



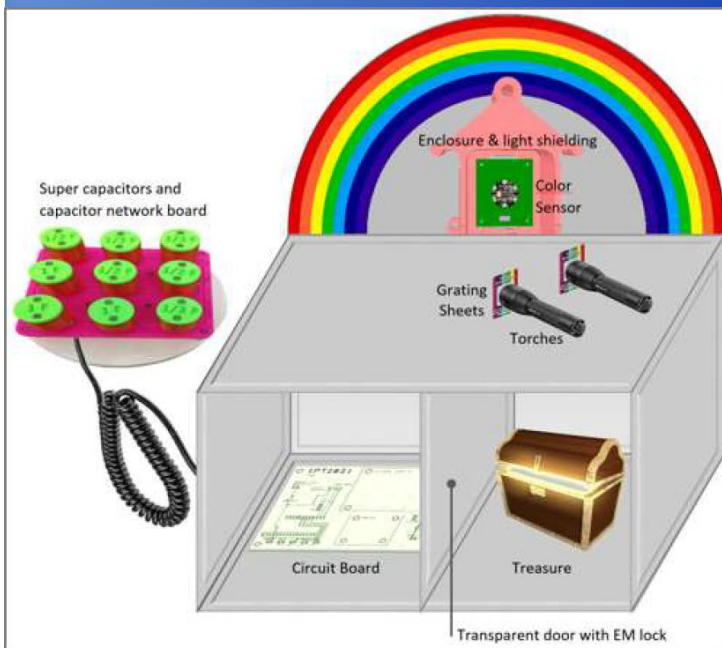
E4PHY001C

(Token-required)

Physics Course (Level IV): The “Safe Cracking” International Physics Tournament Training Phase I

Dr CHAN Mau Hing

Lecturer, The Department of Physics, Hong Kong Baptist University



Intended Learning Outcomes

Upon completion of the programme, participants should be able to:

1. describe the electronic components for safe development;
2. explain some physics puzzles adopted in previous safes;
3. propose creative safe ideas for building a safe;
4. develop the essential skills and a creative mind to solve problem with innovative solutions.



◆ Introduction

This training programme series aims to provide experimental physics training and apply physics principles to develop a locking mechanism (Safe) for the “Safe Cracking” International Physics Tournament (IPT). The safe development may involve app development (App Inventor), microcontroller interfacing and programming, concepts of analog and digital data, relay controls, applications of sensors, data measurements, mechanical drawing using 3D printer, and electronics with circuit board development. Training to break in other teams’ safes will also be provided. To strengthen the experimental skills, theoretical physics lectures would also be given.

◆ Schedule

Session	Date	Time	Venue
1	16 Aug	9:30 a.m. – 12:30 p.m.	Room 206, HKAGE
2		1:30 p.m. – 4:30 p.m.	
3	23 Aug	9:30 a.m. – 12:30 p.m.	
4		1:30 p.m. – 4:30 p.m.	

Remarks:

1. Phase I students must attend the selection test at 1:30 p.m. - 4:30 p.m. on 23 Aug for selection to join Phase II training. Zero mark will be given for those who are absent from the selection test.
2. Promotion to Phase II: The 5 best-performing students in Phase I selection test will be selected to join Phase II training (around Sep 2022 - Feb 2023) and 1-week IPT in Israel (around Mar - Apr 2023). For details, please visit the official website of IPT: <https://davidson.weizmann.ac.il/en/programs/cracking>. Furthermore, you can watch the video of IPT 2019 via the following link for more information: <https://youtu.be/SAI0heCjZgQ>.
3. Tentative arrangement for Phase II training is 10 sessions on: 24 Sep 2022, ~~22~~ 15 Oct 2022, 26 Nov 2022, 28 Jan 2023, 25 Feb 2023; at 9:30 a.m. - 12:30 p.m. and 1:30 p.m. - 4:30 p.m.

◆ Target Participants

- S3 to S4 HKAGE student members in 2021/22 school year
- Class size: 10

◆ Pre-requisite

No special prerequisites are needed, but preferably has talent in development skills in physics experimental setup, experience in conducting experimental physics, and good communication and presentation skills in English.

◆ Medium of Instruction

English (supplemented with Cantonese) with English handouts

◆ Screening

Please answer the screening questions in the online application form.

*The screening questions are designed to help the applicant understand the course level and the course content. The questions must be answered by the student applicant and it can only be attempted once. The answers cannot be changed once the application is submitted. Selection is based on students’ performance in answering the questions. Only students who can demonstrate motivation and knowledge of physics in the screening questions can be enrolled in the programme.

◆ Certificate

E-Certificate will be awarded to participants who have:

- attended at least 3 sessions; and
- completed all the assignments with satisfactory performance.



◆ Sample Notes

Safe Idea #2: Color Generation

Produce a color that cannot be found from natural rainbow.



Components:

- Grating
- Long-pass filter
- Short-pass filter
- Color / bandpass filter
- Polarizer
- Neutral density filter
- Photochromic filter



Intensity of Transmitted Polarized Light

I_o = Unpolarized light intensity

I = Light intensity after passing through a polarizer

$$I = I_o / 2$$

θ = Angle between electric field and the polarizing direction

$$I = I_o \cos^2 \theta$$

