



Developing Hands-On Experimental Educational Tools for the Enhancement of Teaching and Learning in Wave Physics

Kwing To (Toby) Lai^{1,*}, Kin Fung Lai², Ka Kin Lam², Tak Hong Chan², Tran Trung Luu²

¹ Faculty of Science, The University of Hong Kong, Pokfulam, Hong Kong

² Department of Physics, The University of Hong Kong, Pokfulam, Hong Kong

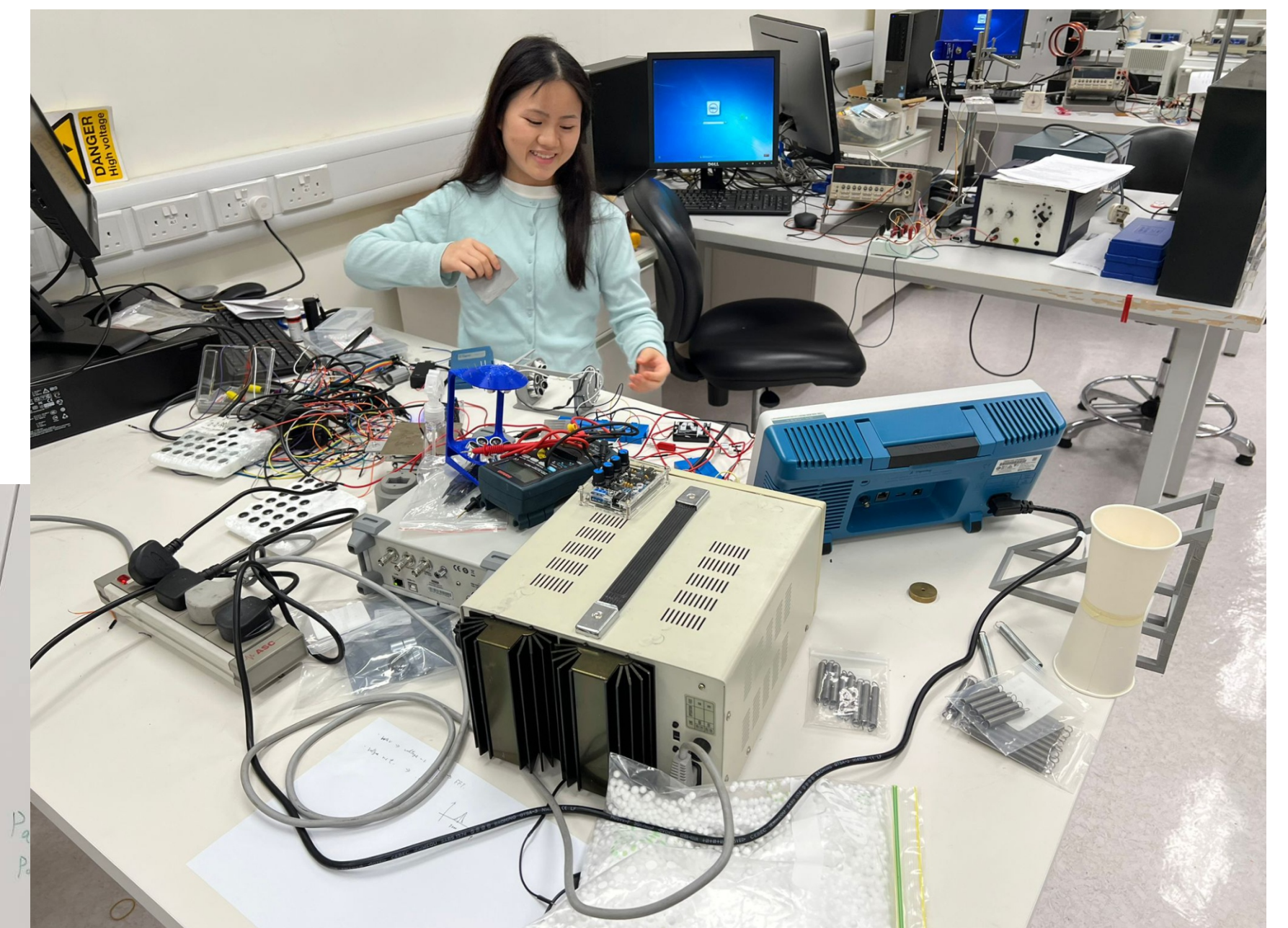
*Email: tobylai@hku.hk

1 Motivation

Wave physics underpins many technologies and experiences that shape everyday life, from wireless communication and acoustic engineering to the science of music. Yet, despite this relevance, wave phenomena remain difficult to teach effectively, especially to non-science majors. Most waves are invisible, and students are often asked to understand them through mathematical formulas and abstract technical language rather than direct experience. This gap between theory and intuition can hinder effective learning, and students could often lose motivation. Motivated by these challenges, this project aims to transform the teaching of wave physics through customised, hands-on experimental demonstration tools that make abstract concepts directly observable. By connecting textbook principles with real-world applications, the project seeks to strengthen students' visual understanding, intuitive grasp, and overall confidence in learning fundamental wave concepts across interdisciplinary undergraduate settings.

2 Working with Undergraduate Students

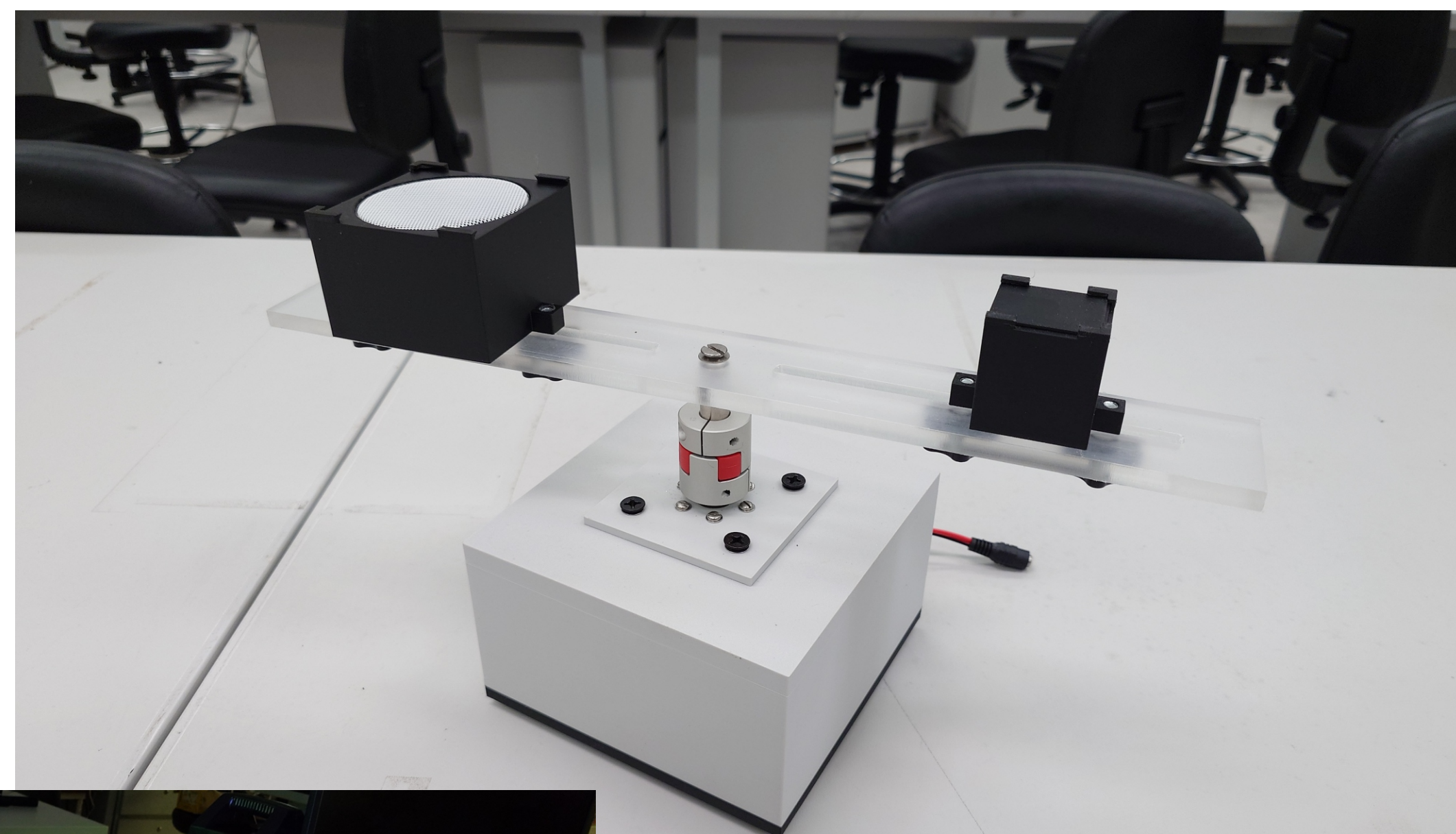
We recruited 4 undergraduate physics students to participate as student research assistants in the design, testing, and construction of the demonstration kits developed in this project, promoting undergraduate research opportunities.



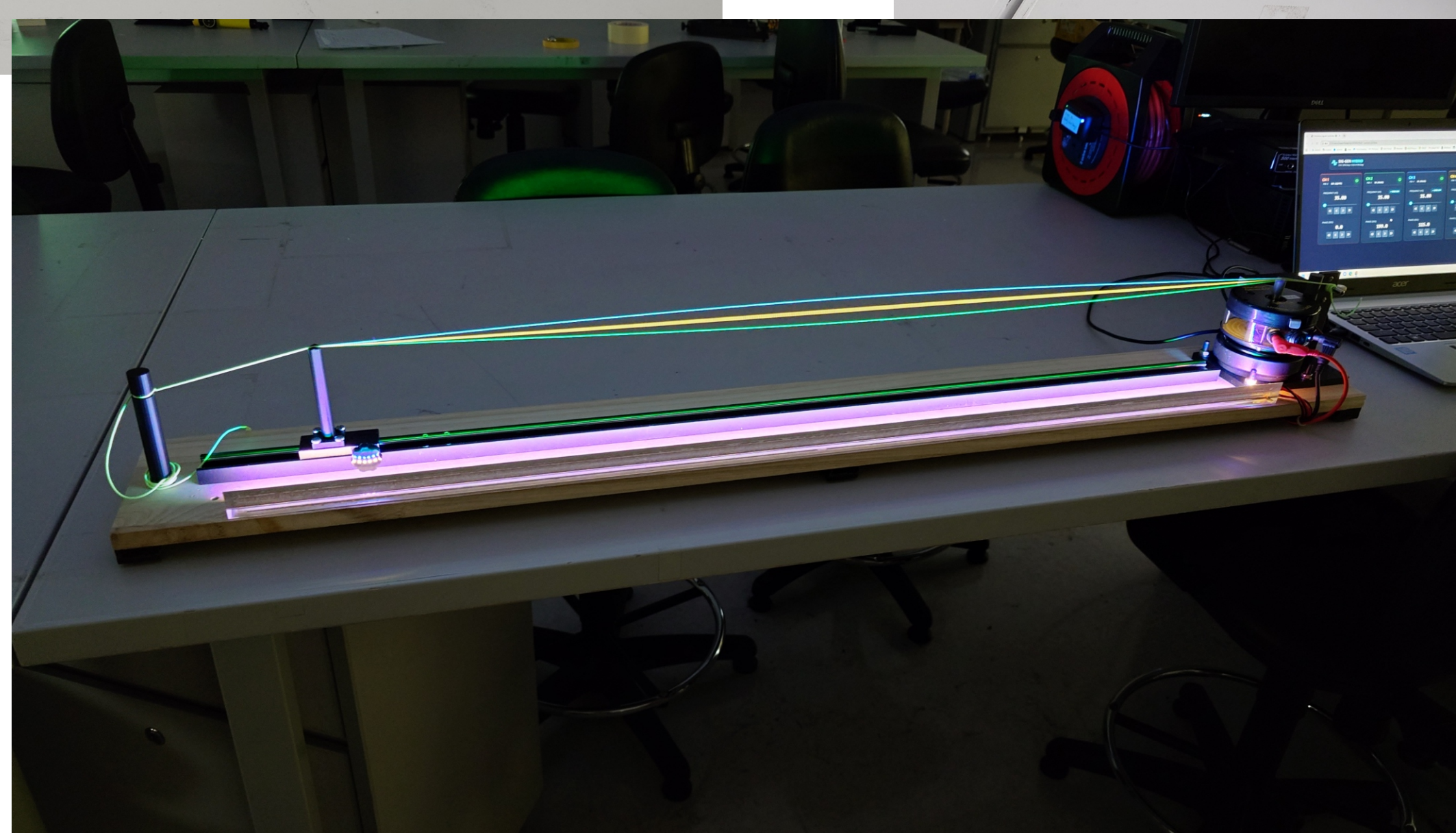
3 Wave Physics Demonstration Tools



Sound Interference Setup



Doppler Effect Setup



Visualisation of Standing Waves in a String Setup



Acoustic Levitation Setup

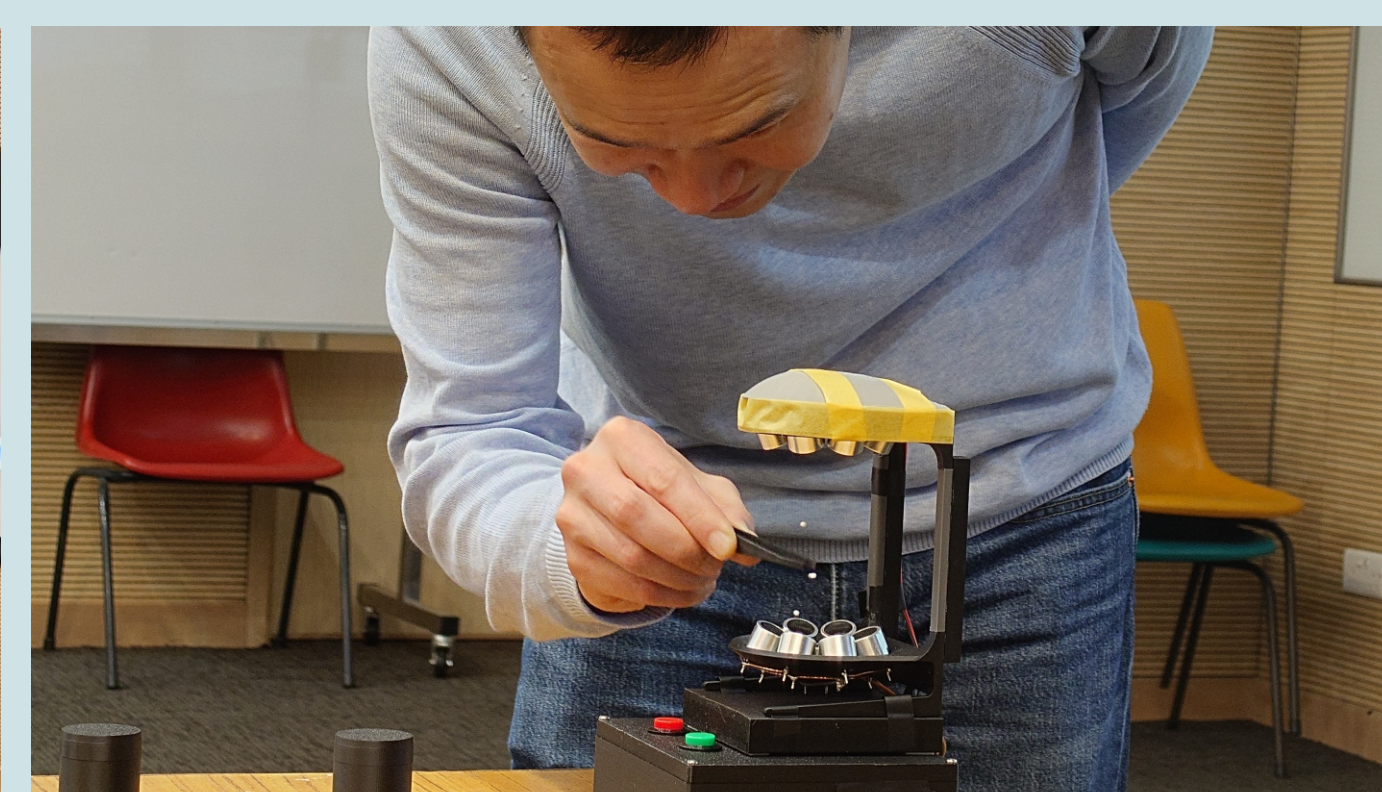
4 Class Activities



PHYS1055
How
Things Work

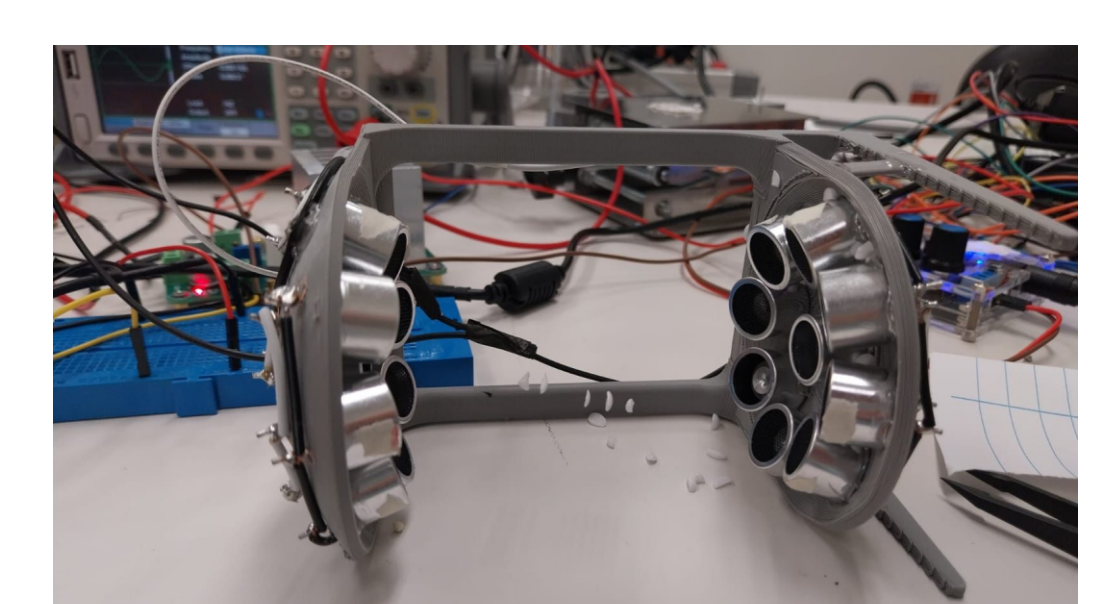


CCST9014
Science and Music



5 Perspectives

We aim to implement the developed demonstration tools in more courses and workshops involving wave physics. The concept of the demonstration tools will also be promoted to facilities across the university, inspiring new ideas for better teaching and learning activities. This could potentially lead to collaboration in the development of new tools.

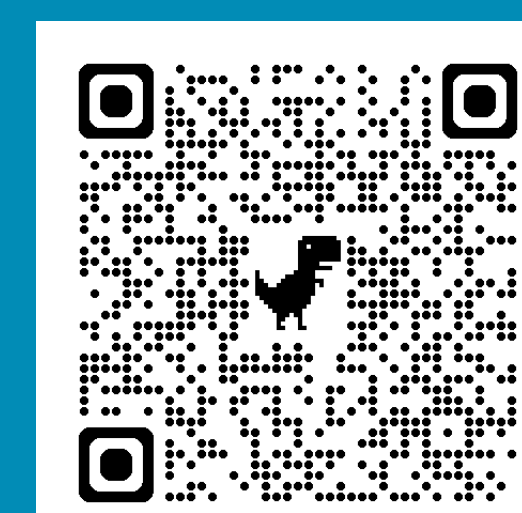


Behind the scene: Working in progress...

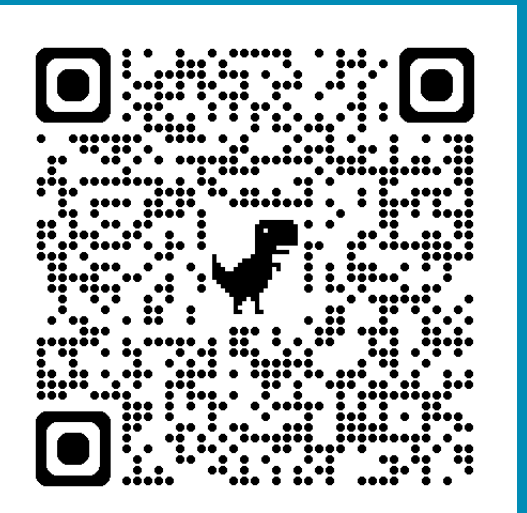
Acknowledgements

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Extras



String Vibration-Fundamental



String Vibration-2nd harmonics