

# Qianhang Ding

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## Education

**PhD in Physics** 09/2018 – 06/2023  
Department of Physics, The Hong Kong University of Science and Technology

**Bachelor of Science** 09/2014 – 06/2018  
Department of Physics, College of Physics and Electronic Engineering, Shanxi University

## Employment

**Senior Researcher** 10/2023 – present  
Center for Theoretical Physics of the Universe (CGA Group), Institute for Basic Science

**QUPIP Researcher** 05/2024 – 06/2024  
International Center for Quantum-field Measurement Systems for Studies of the Universe and Particles

**Research Assistant** 09/2022 – 08/2023  
Department of Physics, The Hong Kong University of Science and Technology

## Research

### Research Interests

Theory: gravitational wave cosmology, cosmic tensions, primordial black hole, and fundamental topics  
Observation: multi-messenger astronomy such as CMB physics, gravitational wave and pulsar astronomy

### Research Works

Standard Timers: tracking redshift-time relation through the statistics in cosmological dynamical systems  
Hubble Parameter Measurement with PBHs: using the statistics in PBH systems to probe Hubble parameter  
Dark Matter in Multi-messenger Astronomy: studying the imprints of dark matter with multi-messengers  
Cosmic Tension in Void: reconciling Hubble tension and CMB anomalies in void cosmology  
Collider in the Universe: studying cosmological collider in CMB and gravitational collider in PSR-BH binary

### Summary of Publications

[INSPIRE HEP](#): 178 citations, h-index: 7, 16.2 citations per paper

## Teaching Assistant

PHYS3031: Mathematical Methods in Physics II, HKUST Fall Term 2020 – 2021

PHYS1114: General Physics II, HKUST Fall & Spring Term 2019 – 2020

PHYS1002: Introduction to Astrophysics and Astronomy, HKUST Spring Term 2018 – 2019

## Project Mentoring

Capstone Project: Three Body System Analysis, Mentoring for three students, HKUST 2020 – 2021

## Awards and Distinctions

Selected Young Scientist Participant, *The Hong Kong Laureate Forum* 2022

Honorable Mention for Best Teaching Assistant, *Department of Physics, HKUST* 2020

Postgraduate Studentship, *HKUST* 2018 – 2022

National Scholarship, *Ministry of Education of the People's Republic of China* 2016

## Service

The journal referee for *The Astrophysical Journal Letters*

The organizer of IBS CTPU-CGA Workshop on (Primordial) Black Holes and Gravitational Waves 2024

The chair of 2023 Joint Annual Conference of Physical Societies in Greater Bay Area 2023

The organizer of journal club talk series at fundamental physics group of IAS HKUST 2018 – 2022

The assistant of IAS Program on High Energy Physics 2019, 2020, 2022

The assistant of IAS Workshop on Black Holes, Inflation and Gravitational Waves 2019

The assistant of Pan Pearl River Delta Physics Olympiad 2019, 2020, 2022

## Skills

**Computer Languages**      Mathematica, Python, C, HTML, CSS, L<sup>A</sup>T<sub>E</sub>X

**Programming**              MCMC, N-body simulation, Gradient descent, Error BP algorithm

**Software Tools**            BlackHawk, CAMB, MathGR, Blender

**Outreach**                    Astrophotography [[Channel](#)]  
Popular science article for the Hong Kong Laureate Forum [[Link](#)]

## Conference & Seminar Talks

Seminar Talk, *High Energy Accelerator Research Organization, KEK* 06/06/2024  
*A Gigaparsec-scale Local Void and Cosmological Principle*

IBS CTPU-CGA 2024 Workshop on (Primordial) Black Holes and Gravitational Waves 19/03/2024  
*Primordial Black Hole Binaries as a Probe of Hubble Parameter*

Gravity and Cosmology 2024, *Yukawa Institute for Theoretical Physics, Kyoto University* 06/02/2024  
*Reconciling Cosmic Dipolar Tensions with a Gigaparsec Void*

High1 Workshop on Particle, String and Cosmology, *KIAS and IBS CTPU-CGA* 24/01/2024  
*Primordial Black Hole Binaries as a Probe of Hubble Parameter*

New Perspectives on Cosmology 2024, *APCTP* 11/01/2024  
*Primordial Black Hole Binaries as a Probe of Hubble Parameter*

International Workshop on Multi-probe approach to wavy dark matters, *Korea University* 30/11/2023  
*A Dark Matter Probe in Accreting Pulsar-Black Hole Binaries*

International Symposium on Cosmology and Particle Astrophysics CosPA 2023, *CUHK* 12/11/2023  
*A Dark Matter Probe in Accreting Pulsar-Black Hole Binaries*

Seminar Talk, *Huazhong University of Science and Technology* 14/09/2023  
*A Dark Matter Probe in Accreting Pulsar-Black Hole Binaries*

2023 Joint Annual Conference of Physical Societies in Greater Bay Area, *CityU* 02/08/2023  
*Reconciling Cosmic Dipolar Tensions with a Gigaparsec Void*

Cosmology from Home 2023 [[Video](#)] 06/07/2023  
*Reconciling Cosmic Dipolar Tensions with a Gigaparsec Void*

Seminar Talk, *Chongqing University* 26/04/2023

*A Dark Matter Probe in Accreting Pulsar-Black Hole Binaries*

Gravitation and Relativistic Astrophysics 2023, CPS, <i>Chongqing University</i> <i>A Gigaparsec-scale Local Void and Cosmological Principle</i>	23/04/2023
Seminar Talk, <i>Sun Yat-Sen University</i> <i>Measure the Universe with Cosmological Standard Timers</i>	10/03/2023
Seminar Talk, <i>Sun Yat-Sen University</i> <i>A Gigaparsec-scale Local Void and Cosmological Principle</i>	08/03/2023
Seminar Talk, <i>Tsung-Dao Lee Institute</i> <i>A Gigaparsec-scale Local Void and Cosmological Principle</i>	13/02/2023
Seminar Talk, <i>Tsinghua University</i> <i>A Gigaparsec-scale Local Void and Cosmological Principle</i>	26/10/2022
Seminar Talk, <i>Institute of Theoretical Physics, Chinese Academy of Science</i> <a href="#">[Video]</a> <i>Measure the Universe with Cosmological Standard Timers</i>	20/10/2022
The 15th Asia Pacific Physics Conference, <i>AAPPS, Korean Physical Society</i> <i>Cosmological Standard Timers in Primordial Black Hole Scenarios</i>	23/08/2022
The 23rd International Conference on General Relativity and Gravitation, <i>ITP, CAS</i> <i>Cosmological Standard Timers in Primordial Black Hole Scenarios</i>	07/07/2022
Cosmology from Home 2022 <a href="#">[Video]</a> <i>Cosmological Standard Timers in Primordial Black Hole Scenarios</i>	05/07/2022
Gravity: Current challenges in black hole physics and cosmology, <i>YITP, Kyoto University</i> <i>Cosmological Standard Timers from Unstable Primordial Relics</i>	29/06/2022
Atlantic General Relativity 2022, <i>Memorial University of Newfoundland and Labrador</i> <i>Cosmological Standard Timers from Unstable Primordial Relics</i>	18/05/2022
The KEK-PH + KEK-Cosmo joint workshop on “Primordial Black Holes”, <i>KEK</i> <i>Ultrahigh-energy Gamma Rays and Gravitational Waves from Primordial Exotic Stellar Bubbles</i>	19/10/2021
The 24th International Conference on Particle Physics and Cosmology, <i>UIUC</i> <i>Ultrahigh-energy Gamma Rays and Gravitational Waves from Primordial Exotic Stellar Bubbles</i>	05/08/2021
Innovative Talk, USTC Seminar Series, <i>University of Science and Technology of China</i> <i>Ultrahigh-energy Gamma Rays and Gravitational Waves from Primordial Exotic Stellar Bubbles</i>	30/05/2021
Seminar Talk, <i>Particle Cosmology Group, University of Science and Technology of China</i> <i>Detectability of Gravitational Waves from the Coalescence of Massive PBHs with Initial Clustering</i>	19/11/2019
Gordon Research Seminar on Particle Physics, <i>HKUST</i> <i>Detectability of Gravitational Waves from the Coalescence of Massive PBHs with Initial Clustering</i>	29/06/2019