

Xinpeng WANG

Visiting Student @ Kavli IPMU, The University of Tokyo,
Ph.D. Candidate @ Tongji University

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EDUCATION

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- 2023-Present **Visiting Student**, The University of Tokyo, Kavli IPMU
Advisor : Professor Misao Sasaki
- 2022-Present **Ph.D. Candidate in Theoretical Physics**, Tongji University, College of Physics and Engineering
Advisor : Professor Ying-Li Zhang
- 2018-2022 **B.S. in Applied Physics**, Tongji University, School of Physics and Engineering.
Thesis : Gravitational Wave Signals from Primordial Black Hole Mergers, GPA : 4.58/5 or 91.2/100.

RESEARCH INTERESTS

Gravitational Waves, Black Holes, The early Universe, Primordial Perturbations, Non-Gaussianity.

RESEARCH PUBLICATIONS

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- 2024-2025 **X. Wang**, M. Sasaki and Ying-Li Zhang, *Dual Primordial Black Hole Formation from Two-stage Inflation*.
‣ **Current State : To appear in Jan 2025.**
‣ **Personal Contribution : Main contributor** and first author.
- Jinsu Kim, **X. Wang**, and Y. L. Zhang, *R^3 -corrected Starobinsky–Higgs inflation*.
‣ **Current State : To appear in Jan 2025**
‣ **Personal contribution : Main contributor (alphabetical authorship order).**
- 2023-2024 **X. Wang**, Y. L. Zhang and M. Sasaki, *Enhanced Curvature Perturbation and Primordial Black Hole Formation in Two-stage Inflation with a break*, [arXiv:2404.02492].
‣ **Published in JCAP 07 (2024) 076** and has earned 15 citations to date.
‣ **Personal contribution : Main contributor** and first author.
- Analytical and Numerical Calculations for the background and perturbation evolution, power spectrum and non-Gaussianity.
- Calculations for Primordial black hole (PBH) and induced gravitational wave power spectrum.
- Paper drafting.
- X. Wang**, X. H. Ma and M. Sasaki, *On piecewise quadratic potential inflation*, [arXiv:2412.16463].
‣ **Current State :** Prepared for a book in memory of Alexei Starobinsky "Open Issues in Gravitation and Cosmology", to be published by Springer.
‣ **Personal Contribution : Main contributor** and first author.
- Analytical and numerical calculations of the power spectrum and non-Gaussianity.
- Calculations of PBH abundance considering exponential tail.
- Paper drafting.
- 2022-2023 **X. Wang**, Y. L. Zhang, R. Kimura and M. Yamaguchi, *Reconstruction of power spectrum of primordial curvature perturbations on small scales from primordial black hole binaries scenario of LIGO/VIRGO detection*, [arXiv:2209.12911 [astro-ph.CO]].
‣ **Published in Sci.China Phys.Mech.Astron.** 66 (2023) 6 as **Editor's Recommendation** and has earned 47 citations to date, **ESI Highly cited paper.**
‣ **Personal contribution : Main contributor** and first author.
- Analytical calculations and the method developing.
- Analysis of the data from O1 to O3 run.
- Paper drafting.

WORKS IN PROGRESS

2023-Present **X. Wang**, J. Garcia-Bellido, and S. Kuroyanagi, *Late Time Primordial Black Hole Mergers for LVK O4*.
> **Current State** : In progress.
> **Personal Contribution : Main contributor**. Coding for the transfer function based on waveform model and mock data generation.

X. H. Ma, K. D. Lozanov, and **X. Wang**, *Lattice Simulation for the Thermalization of Quantum Fields*.
> **Current State** : In progress.
> **Personal Contribution : Main contributor (alphabetical authorship order)**. Coding for the lattice simulation and data analysis.

PRESENTATIONS AND SEMINARS

- Nov 2024 **Contributed talk** at Focus Week on Primordial Black Holes 2024, Kavli IPMU, Japan
Primordial Black Hole formation from Curvature perturbation enhanced during inflation
- Nov 2024 **Contributed talk** at 2nd Workshop on Dynamics of Primordial Black Hole Formation, Nagoya University, Japan
Primordial Black Hole formation from Curvature perturbation enhanced during inflation
- Oct 2024 **Invited seminar** at Special Seminar in USTC cosmology group, The University of Science and Technology of China, China
Enhanced curvature perturbation and non-Gaussianity during Inflation
- Oct 2024 **Contributed poster** at COSMO'24, Kyoto University, Japan
Enhanced Curvature Perturbation and Primordial Black Hole Formation in Two-stage Inflation with a break
- Sep 2024 **Contributed talk** at IBS-Tokyo Tech-USTC 2024 Summer School and Workshop, Tateyama, Japan
Enhanced curvature perturbation and non-Gaussianity during Inflation : A detailed analysis of generalized Starobinsky's model
- Sep 2024 **Contributed poster** at The Fundamentals Summer school in High energy and gravitational physics, University of Split, Croatia
Enhanced Curvature Perturbation and Primordial Black Hole Formation in Two-stage Inflation with a break
- Jun 2024 **Contributed talk** at The International Symposium on Cosmology and Particle Astrophysics 2024, Yangzhou University, China (CosPA 2024)
Enhanced Curvature Perturbation and Primordial Black Hole Formation in Two-stage Inflation with a break
- Mar 2024 **Invited talk** at IBS-CPTU-GGA 2024 Workshop on (Primordial) Black Holes and Gravitational Waves, IBS, Korea
Enhanced Curvature Perturbation and Primordial Black Hole Formation in Two-stage Inflation with a break
- Feb 2024 **Contributed talk** at YITP long-term workshop, Gravity and Cosmology 2024, YITP, Japan (GC2024)
Enhanced Curvature Perturbation and Primordial Black Hole Formation in Two-stage Inflation with a break
- Jan 2024 **Invited talk** at New Perspectives on Cosmology 2024, APCTP, Korea (NPOC2024)
Primordial Black Holes from R^2 gravity theory with a non-minimally coupled scalar field
- Dec 2023 **Contributed talk** at The 32nd Workshop on General Relativity and Gravitation in Japan, Nagoya University, Japan (JGRG2023)
Primordial Black Holes from R^2 gravity theory with a non-minimally coupled scalar field

- Nov 2023 **Contributed talk** at Focus Week on Primordial Black Holes 2023, Kavli IPMU, Japan
Primordial Black Holes from R^2 gravity theory with a non-minimally coupled scalar field
- Apr 2023 **Contributed talk** at the Annual Meeting of the Chinese Physical Society, Division of Gravitation and Relativistic Astrophysics, Chongqing University, China
From the merger of Primordial Black Holes to the Primordial Power Spectrum of curvature perturbations

+ LEADERSHIP AND OUTREACH

- Feb 2024 **Host of Weekly Random Discussion in IPMU's Theoretical Cosmology Group**
-Present
 - > Started and organized the **weekly discussion** with Professor Misao Sasaki, postdocs and students in IPMU.
 - > Introduced at least 1 paper/topic per discussion.
 - > Discussed topics on cosmology, astrophysics, general relativity and high-energy physics.
- Sep 2022 **Host of Discussion Group on Cosmological Perturbation Theory**
-Apr 2023
 - > Started and organized the **weekly discussion** with 6 graduate students from ITP-CAS and TongjiU on cosmological perturbation theory.
 - > Contributed 5 blackboard talks to the discussion series.
- Apr.3 2022 **Invited Public Talk : *Our Universe***
 - > Presented at ximalaya.com (The largest online audio platform in China) for **1424 online participants**.
 - > Gave a talk on the history of our universe and the latest research topics of cosmology.
- 2021-2022 **President of Students' Association Union of Tongji University**
 - > Coordinated the student's associations (in total 136) on campus.
 - > Led a team of **200+ students** to organize events with **over 10,000 participants**.
- Aug 2019 **Volunteer Teacher** in Shaanxi Xingzhi Charity Alliance 2020 Online Rural Summer Camp
 - > Gave a month's online lectures for Science and Art to primary school students in Laobaozi Village, Xi'an, Shaanxi Province.
- Apr 2019 **Volunteer Teacher** in Tongji Primary School
 - > Delivered a lecture on Non-Newtonian fluid.

🎓 SCHOLARSHIP AND AWARDS

- 2024 Outstanding Graduate student for Social Activities of Tongji University
- 2023 China Scholarship Council Fellowship for international exchange students
- 2022 Graduate Entrance Scholarship (**Top 3%**)
- 2022 Outstanding Graduate of Tongji University
- 2022 Outstanding Undergraduate Thesis of Tongji University (1st place in Theoretical physics group)
- 2021 Outstanding Student Leader of Tongji University
- 2021 The First Prize Scholarship of Tongji University (**Top 3%**)
- 2020 National College Students Innovation and Entrepreneurship Training Program (**PI**)
- 2020 First Prize in the 3rd "Zhuo Yue Bei" Physics Experiment Competition
- 2020 The First Prize Scholarship of Tongji University (**Top 3%**)
- 2019 The Second Prize Scholarship of Tongji University (Top 10%)

🎓 TEACHING AND MENTORING

- 2023 Spring **Teaching Assistant** for Undergraduate Physics Experiment 2
- 2022 Spring **Teaching Assistant** for Optical Experiments
- 2022 Fall **Teaching Assistant** for Experiments of Mechanics and Thermodynamics

📋 SKILLS

- Programming** Mathematica, MatLab, Python, Julia, \LaTeX
- Language** Chinese (Native), English (Fluent), Japanese (Intermediate)
- Other Skills** Adobe Photoshop, Adobe Illustrator, Photography, Japanese flower arrangement (Primary), Digital Painting and Poster Design (Experienced).