Chris Choi

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Research Interests

Theoretical cosmology, gravitational waves, modified gravity (massive gravity), inflation, computational physics

Education

Carnegie Mellon University Pittsburgh, PA

BS in Physics *Aug 2020 – May 2024*

- Astrophysics Track
- Minor in Mathematical Sciences
- Selected Coursework: General Relativity (PhD), Mathematical Physics (PhD), Extragalactic Cosmology

Research Experience

Belle II Experiment: Calibration of the Drift Chamber Feb 2022 – Aug 2022

- Designed and ran tests for the calibration of the drift chamber in the SuperKEK particle accelerator
- Provided a correction to the software for the filtering of the data from the drift chamber
- **Advisors**: Jitendra Kumar and Prof. Roy A. Briere (CMU)

Free Streaming Neutrino Damping of Primordial Gravitational Waves Jan 2023 – Jun 2023

- Applied the results of Weinberg (2003) to gravitational waves produced during different eras
- Verified that the damping constant is in agreement with Weinberg and Maggiore (2018)
- **Advisors**: Murman Gurgenidze and Prof. Tina Kahniashvili (CMU)

Massive Gravity and its Signals in Stochastic Gravitational Wave Background Jun 2023 – Present

- Reproduced gravitational wave background from the 15-year data set from the NANOGrav collaboration using a model of time-dependent massive gravity from Fujita (2018)
- Found region in parameter space of graviton mass and rate of inflation to explain signal [1]
- **Advisors**: Emma Clarke, Murman Gurgenidze and Prof. Tina Kahniashvili (CMU)

Teaching Experience

Teaching Assistant — Physics I for Engineers (CMU) Aug 2021 – Dec 2021

- Provided assistance to students with homework and lecture during the class's Course Center

Teaching Assistant — Basic Experimental Physics (CMU) Jan 2022 – May 2022

- Helped set up the laboratory and prepared radioactive samples and low temperature gases for experiments

Tutor — Physics Assignment Tutoring Help (CMU) Aug 2023 – Present

- Helped students with homework from any undergraduate physics course in the department

Workshops and Events

Physics Undergraduate Research Symposium — Presenter (CMU) Apr 2022, 2023

- Presented posters on my dE/dx research with Prof. Briere (2022, 2023) and research on neutrino damping with Prof. Kahniashvili (2023).

Meeting of the Minds — Presenter (CMU) May 2023

- Presented poster on summer research project with Prof. Briere.

CMU McWilliams Jamboree — Presenter (CMU) Nov 2023

- Presented slide on research interests and current projects
- Networked with graduate students and faculty from Carnegie Mellon and University of Pittsburgh (UPitt)

Unravelling the Universe with Pulsar Timing Arrays — Workshop Participant (UPitt) Nov 2023 – Dec 2023

- Learned from experts on pulsar timing arrays and gravitational waves.
- Corresponded with graduate students postdoctoral researchers, and faculty from Carnegie Mellon University, University of Pittsburgh, Montana State University, University of Michigan, and others.

American Astronomical Society 243 Meeting — Presenter (New Orleans) (scheduled) Jan 2024

- Abstract from massive gravity paper [1] accepted
- Awarded funds for travel to present poster at conference

PUBLICATIONS

[1] **Chris Choi**, Jacob Magallanes, Murman Gurgenidze, Tina Kahniashvili. "Stochastic Gravitational Wave Background Detection Through NANOGrav 15-year Data Set in the View of Massive Gravity". In: *Submitted to Physical Review D* (Dec 2023). DOI: 10.48550/arXiv.2312.03932. arXiv:2312.03932 [astro-ph.CO]

ACTIVITIES

CMU Vegan Society (Co-President) Sep 2022 – Present

International Student Union (Treasurer) May 2022 – Present

CMU Headbangers Society (Vice President) April 2023 – Present

Competitive Rubik's Cube Solving Feb 2016 – Present

- Competed in 31 official World Cube Association Competitions, WCA ID: 2016CHOI
- Top 200 in the world for 3x3x3 Fewest Moves, 6x6x6 Cube, and 7x7x7 Cube

HONORS AND AWARDS

Dean's List with High Honors (CMU) 2020, 2021, 2022, 2023

Summer Undergraduate Research Fellowship (CMU) 2022

TECHNICAL SKILLS

Languages: Python, HTML, Java, C, C++, Matlab, SQL, Rust

Frameworks & Software: Mathematica, ROOT, Git, Linux (Ubuntu, Archlinux), LaTeX