

# GENE CARLO BELINARIO

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[R<sup>2</sup>](#) ResearchGate

## Interests

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- ▶ **Astrophysics, Cosmology, Computational Physics, Physics Education**
- ▶ Gravitational Lensing, Gravitational Waves, Dark Energy, Inflation, Data Analysis, Machine Learning

## Education

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- ▶ **Master of Science in Physics**, Feb 2023 – Jul 2025  
National Institute of Physics, University of the Philippines Diliman  
Thesis: *Constraining cosmic gravity with gravitational-wave standard sirens*  
Supervisor: [Michael Francis Ian Vega II, Ph.D.](#)  
Co-mentors: [Reginald Christian Bernardo, Ph.D.](#) & [Reinabelle Reyes, Ph.D.](#)
- ▶ **Bachelor of Science in Applied Physics (Instrumentation)**, Aug 2018 – Feb 2023  
National Institute of Physics, University of the Philippines Diliman  
Honors: *Magna Cum Laude*, General Weighted Average: 1.2843 (1.00 highest – 5.00 lowest)  
Thesis: *Gravitational lensing signatures in gravitational-wave signals from compact binary coalescences*  
Supervisor: [Reinabelle Reyes, Ph.D.](#)

## Research Experience

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- ▶ **Graduate Student Researcher**, Jan 2025 – Jul 2025  
Gravity Group | [Gravity](#)  
National Institute of Physics, University of the Philippines Diliman  
Project: ***Cosmology with Gravitational Waves***
  - Simulated mock gravitational-wave standard siren catalogs with LISA using supermassive black hole binary population models and underlying cosmologies.
  - Performed cosmological parameter estimation using these mock catalogs independently and jointly with electromagnetic probes (e.g. Type Ia Supernovae, Baryon Acoustic Oscillations, Cosmic Chronometers).
  - This project served as a basis of my master's thesis and was presented as a contributed talk at the 42nd Samahang Pisika ng Pilipinas (Physics Society of the Philippines) Physics Conference and Annual Meeting.Project: ***Cosmo-Learn: Code for Learning Cosmology Using Different Methods and Mock Data***
  - Co-developed the cosmo-learn python package for machine learning applications in cosmology.
  - Implemented the simulation pipeline for generating standard siren events from supermassive black hole binaries using different population models and cosmologies.
  - This collaborative work led to a paper [1] submitted to The European Physical Journal C.

## Research Experience (continued)

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- ▶ **Undergraduate Student Researcher**, Aug 2020 – Feb 2023  
Data and Computation Group | [D&C](#)  
National Institute of Physics, University of the Philippines Diliman  
Project: *Gravitational Lensing of Gravitational Waves from Binary Black Hole Mergers*
  - Investigated the detectability of gravitationally lensed gravitational waves with the LIGO Hanford and Livingston detectors.
  - Demonstrated biases arising from the use of lensed waveforms in inferring lens properties.
  - This project served as a basis of my undergraduate thesis and was presented as a contributed talk at the 41st Samahang Pisika ng Pilipinas (Physics Society of the Philippines) Physics Conference and Annual Meeting.

## Teaching Experience

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- ▶ **Instructor of Physics**, Sept 2023 – Jul 2025  
National Institute of Physics, University of the Philippines Diliman
  - Taught lecture and laboratory classes on elementary mechanics, electromagnetism, optics, thermodynamics, and computational physics to undergraduate students majoring in engineering and natural sciences.
  - Graded problem sets and examinations in fundamental physics, classical mechanics, electromagnetic theory, and quantum physics classes of undergraduate students majoring in physics and applied physics.
  - Developed curricula in elementary mechanics and electromagnetism laboratory classes.
- ▶ **Teaching Associate**, Feb 2023 – Aug 2023  
National Institute of Physics, University of the Philippines Diliman
  - Taught lecture and laboratory classes on elementary mechanics, electromagnetism, optics, and thermodynamics to undergraduate students majoring in engineering and natural sciences.

## Skills

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- Coding ▶ Python, Fortran, Git,  $\LaTeX$ , HTML
- Software ▶ Jupyter, VS Code, Mathematica, MATLAB
- Language ▶ English, Filipino

## Recognitions

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- ▶ **Magna Cum Laude**, Jul 2023  
Bachelor of Science in Applied Physics (Instrumentation)  
College of Science, University of the Philippines Diliman
- ▶ **Merit Scholar**, Aug 2018 – Jul 2022  
Science Education Institute, Department of Science and Technology  
Republic of the Philippines
- ▶ **University Scholar**, Academic Year 2018 – 2023  
College of Science, University of the Philippines Diliman
- ▶ **College Scholar**, Academic Year 2018 – 2023  
College of Science, University of the Philippines Diliman

## Involvements

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### Academic

- ▶ **Graduate Student Researcher**, Jan 2025 – Jul 2025  
Gravity Group, National Institute of Physics, University of the Philippines Diliman | [Gravity](#)
- ▶ **Graduate Student Researcher**, Feb 2023 – Dec 2024  
Data and Computation Group, National Institute of Physics, University of the Philippines Diliman | [D&C](#)
- ▶ **Undergraduate Student Researcher**, Aug 2020 – Feb 2023  
Data and Computation Group, National Institute of Physics, University of the Philippines Diliman | [D&C](#)

### Administrative

- ▶ **Examination Committee**, Nov 2024 – Mar 2025  
Philippine Junior Physics Challenge 2025
- ▶ **Head of Technical Services Committee**, Sept 2024 – Jul 2025  
Junior Faculty, National Institute of Physics, University of the Philippines Diliman | [NIP](#)
- ▶ **Examination Committee**, Dec 2023 – Mar 2024  
Philippine Junior Physics Challenge 2024
- ▶ **Member-at-Large & Co-founder**, Mar 2021 – Sept 2022  
Students for the Exploration and Development of Space in the Philippines | [SEDSPPH](#)
- ▶ **Vice President for Academic Affairs**, Sep 2020 – Jul 2021  
UP Physics Association, National Institute of Physics, University of the Philippines Diliman | [UPPA](#)

### Community

- ▶ **Member**, Oct 2024 – Present  
Observational Cosmology and Systematics Working Group, CosmoVerse CA21136 | [CosmoVerse](#)
- ▶ **Member**, Oct 2024 – Present  
Data Analysis in Cosmology Working Group, CosmoVerse CA21136 | [CosmoVerse](#)

### Miscellaneous

- ▶ **Referee**, Jul 2023 – Present  
Proceedings of the Samahang Pisika ng Pilipinas | [SPP](#)
- ▶ **Contributor**, Sept 2020  
Gravity Spy Citizen Science Project, Zooniverse | [Gravity Spy](#)

## Workshops and Invited Talks

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- ▶ **APCTP Workshop on Gravitational Waves 2025**, 20-25 April 2025, *Invited Seminar* by the Asia Pacific Center for Theoretical Physics (APCTP) held at the Institute of Physics, Academia Sinica, Taiwan
- ▶ **1st Jagna Space Encounters - Python for the Stars: Unraveling Space Mysteries with Astronomical Data**, 15-18 January 2025 held at the Research Center for Theoretical Physics (RCTP), Central Visayan Institute Foundation (CVIF), Philippines, *Talk*: "Constraints on cosmic expansion history with standard sirens"
- ▶ **42nd Samahang Pisika ng Pilipinas Physics Conference and Annual Meeting**, 03-06 July 2024 held at the Batangas State University, Philippines, *Contributed Talk*: "Constraining cosmic dark energy with bright standard sirens"
- ▶ **Summer School on Cosmology**, 17-28 June 2024, *Invited Seminar* held at The Abdus Salam International Center for Theoretical Physics (ICTP), Italy

## Workshops and Invited Talks (continued)

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- ▶ **LISA Analysis Tools Workshop**, 15-18 April 2024, *Invited Online Seminar*
- ▶ **Frontiers in Theoretical and Experimental Physics**, 11 March 2024, *Invited Seminar* held at the National Institute of Physics, University of the Philippines Diliman
- ▶ **41st Samahang Pisika ng Pilipinas Physics Conference and Annual Meeting**, 19-21 July 2023 held at the Del Carmen Convention Center and Bayay Numancia, Philippines, *Contributed Talk*: “Gravitational lensing signatures in gravitational waves from binary black hole mergers”
- ▶ **6th GW Open Data Workshop**, 15-17 May 2022, *Invited Online Seminar* by the Gravitational Wave Open Science Center (GWOSC)
- ▶ **5th GW Open Data Workshop**, 23-25 May 2022, *Invited Online Seminar* by the Gravitational Wave Open Science Center (GWOSC)

## Research Publications

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### Journal Articles

- 1 R. C. Bernardo, D. Grandón, J. L. Said, V. H. Cárdenas, G. C. Belinario, and R. Reyes, “Cosmo-learn: Code for learning cosmology using different methods and mock data,” 2025. arXiv: [2508.20971](https://arxiv.org/abs/2508.20971) [[astro-ph.CO](https://arxiv.org/abs/2508.20971)].  
🔗 URL: <https://arxiv.org/abs/2508.20971>.
- 2 E. D. Valentino, J. L. Said, and The CosmoVerse Network, “The CosmoVerse White Paper: Addressing observational tensions in cosmology with systematics and fundamental physics,” *Physics of the Dark Universe*, 2025. 📄 DOI: <https://doi.org/10.1016/j.dark.2025.101965>.

### Conference Proceedings

- 1 G. C. Belinario, R. C. Bernardo, and R. Reyes, “Constraining cosmic dark energy using bright standard sirens,” in *Proceedings of the Samahang Pisika ng Pilipinas*, vol. 42, 2024, SPP-2024-2E-01. 📄 URL: <https://proceedings.spp-online.org/article/view/SPP-2024-2E-01>.
- 2 J. Garrido, G. C. Belinario, J. Rodelas, and J. P. Esguerra, “Lessons from the First Philippine Junior Physics Challenge Examination,” in *Proceedings of the Samahang Pisika ng Pilipinas*, vol. 42, 2024, SPP-2024-1E-01. 📄 URL: <https://proceedings.spp-online.org/article/view/SPP-2024-1E-01>.
- 3 G. C. Belinario and R. Reyes, “Gravitational lensing signatures in gravitational waves from binary black hole mergers,” in *Proceedings of the Samahang Pisika ng Pilipinas*, vol. 41, 2023, SPP-2023-1G-04. 📄 URL: <https://proceedings.spp-online.org/article/view/SPP-2023-1G-04>.

## References

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