Eduardo Mario Gutiérrez

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Citizenship: Argentina/Italy

CONTACT INFORMATION

Institute for Gravitation and the Cosmos
The Pennsylvania State University
321 Whitmore Lab,
Penn State University Park, PA, USA

Website:
https://eduardomgutierrez.github.io/
✉ Email:emgutierrez@psu.edu

CURRENT STATUS

Postdoctoral Scholar Nov 2022-present
- *Place:* Institute for Gravitation and the Cosmos, Penn State University

EDUCATION

Ph.D. in Astronomy 2022
FCAG-UNLP, La Plata, Bs. As., Argentina
- *Thesis:* Radiation from accreting black holes: micro- and macrophysical problems. **Mark:** 10.0/10.0
- *Advisor*: Prof. Gustavo E. Romero. *Co-advisor*: Dr. Florencia L. Vieyro

Licenciado en Astronomía (equiv. to M.Sc. in Astronomy) 2011–2017
FCAG-UNLP, La Plata, Bs. As., Argentina
- *GPA*: **9.79/10.0**. Ranked first in class.
- *Thesis*: Cosmology and primordial black holes. **Mark**: 10.0/10.0
- *Advisor*: Prof. Gustavo E. Romero. *Co-advisor*: Dr. Florencia L. Vieyro

FELLOWSHIPS AND AWARDS

- Institute for Gravitation and the Cosmos Fellowship 2022
- CONICET Doctoral Fellowship 2017
- *2016 Distinguished Graduate (Astronomy)*, for the highest mark of the promotion UNLP, 2017
- *Joaquín V. González Award*, for outstanding marks Government of La Plata, 2017

RESEARCH STAYS AND SCHOOLS

- Visitor at Columbia University and the CCA, Flatiron Institute (four days) Oct 2024
- Visitor at the Perimeter Institute (a week) Sep 2024
- Visitor at KIPAC, Stanford University (2 days) Apr 2024
- Visitor at the Institut d'Astrophysique de Paris (a week) Oct 2023
- Visitor at the Center for Computational Relativity and Gravitation of the Rochester Institute of Technology (CCRG-RIT) (a week) Jan 2023
- Visiting scholar at the Center for Computational Relativity and Gravitation of the Rochester Institute of Technology (CCRG-RIT) Sep 2020 - Feb 2021
  Advisor: Prof. Manuela Campanelli
  Topic: Electromagnetic emission from supermassive binary black holes
- School on High Energy Astrophysics Aug 2019
  Place: ICTP-SAIFR, São Paulo, São Paulo, Brasil
- ISAPP 2019, Cosmic Ray Vision from the Southern Sky Mar 2019
  Place: Pierre Auger Observatory, Malargue, Mendoza, Argentina.
- SPSAS-HighAstro, São Paulo School of Advance Science in High Energy Astrophysics in the CTA era May 2017
  Place: IAG-USP, São Paulo, São Paulo, Brasil.
- IFT-Perimeter-SAIFR Journeys into Theoretical Physics Jun 2016
  Place: ICTP-SAIFR, São Paulo, São Paulo, Brasil.

MENTORING

2023- Tomás Mazzei advisor of M.Sc. thesis in Astronomy, UNLP.

2023 Louis Buchalter — co-advisor of REU summer research program, Penn State
2023-2024 Nilay Mancini — co-advisor of a short research program, Penn State

Grants and travel funding

2023- Co-PI in allocation award: "Numerical Relativity Simulations of Compact Binary Mergers". Total Award: 238 million core hours in Frontera (TACC, USA) (PI: David Radice)

2021 Collaborator in NSF grant: "Collaborative Research: Supermassive Binary Black Hole Mergers: Accretion Dynamics and Electromagnetic Output" (at NSF Windows on the Universe: The Era of Multi-messenger Astrophysics) (PI: Manuela Campanelli and Julian Krolik)

2020 Collaborator in allocation award: "Supermassive Black Hole Approaching Merger: Accretion Dynamics, Jets and Electromagnetic Signals". Total Award: 230 million core hours in Frontera (TACC, USA) (PI: Manuela Campanelli)

2016,2017,2018,2019 Full funding given by FAPESP and the ICTP to attend 3 schools at the ICTP-SAIFR and at IAG-USP, São Paulo, Brasil; Full funding given by the Pierre Auger Observatory for the two-week school 'ISAPP 2019: Cosmic Ray Vision from the Southern Sky' in Malargue, Mendoza, Argentina

Presentations/ Colloquia

- Invited talk, Perimeter Institute Strong Gravity Seminar (ON, Canada) — Sep 2024
- Invited talk, IAR Colloquium (Bs. As., Argentina) — Apr 2024
- Invited talk, FCAGLP Seminar (Bs. As., Argentina) — Apr 2024
- Invited talk, Tea Talk at KIPAC, Stanford (CA, USA) — Apr 2024
- Invited talk, HEPRO VIII (Paris, France) — Oct 2023
- Invited talk, GdR Ondes gravitationnelles workshop (Paris, France) — Oct 2023
- Invited talk, New Frontiers in GRMHD Simulations of Accreting Black Holes (Virtual) — Apr 2023
- Invited talk, CCRG-RIT Lunch meeting (NY, USA) — Apr 2023
- Invited talk, Black Hole Group (CIERA, Northwestern University) meeting (Virtual) — Nov 2021
- Invited talk, Black Hole Group (IAG-USP, Brazil) meeting (Virtual) — Apr 2021
- Invited talk, IAR Colloquium (Virtual) — Apr 2021
- Invited talk, CCRG-RIT Lunch meeting (NY, USA) — Nov 2020
- **13** Contributed talks at conferences, including ICRC2025, GR25-Amaldi16, TeVPA2024, and others.

Teaching experience

More than **7 years as a teaching assistant and 2 years as an instructor** in several courses of mathematics, physics, and astrophysics at the Universidad Nacional de La Plata. Including: *Black Hole Astrophysics, Relativistic Astrophysics, Calculus, Electromagnetism, and Classical Mechanics.*

Technical Skills

- Computational skills:
  - *Programming Languages*: C/C++, Python, Fortran, LaTeX.
  - *Astrophysical Software*: `Athena++`, `AthenaK`, `Harm3D` (GRMHD), `Bothros` (GRRT), `Paramo` (Nonthermal particle transport)
  - *Use of supercomputers:* Frontera, NERSC clusters, Aurora

Outreach activities

Various outreach talks and articles. *Detail:*

- Articles: The jet of Centaurus A as never seen before (IAR Bulletin, Sep 2021), *Multimessenger astronomy* (IAR Bulletin, Sep 2019), The first image of a black hole (IAR Bulletin, Jun 2019)
- Public talks: *The first image of a black hole* (La Plata Planetarium, May 2019), *What is a black hole?*

Professional service

- Reviewer in scientific journals and institutions: The Astrophysical Journal Letters, The Astrophysical Journal, Astronomy & Astrophysics

- Co-organizer, 1st Latin American Meeting of Scientific Philosophy, Bs. As., Argentina — Sep 2015

Refereed Publications

9 as first author, **4** as second/third author; **19** in total. For the full list, go to my **ADS Library**.

1. Cook, W.; **Gutiérrez, E.M.**; Bernuzzi, S.; Radice, D.; Daszuta, B.; Fields, J.; Hammond, P.; Bandyopadhyay, H.; Jacobi, M.
   Magnetic Field Configurations in Binary Neutron Star Mergers II: Inspiral, Merger and Ejecta
   arXiv:2508.19342 (submitted to Phys. Rev. D, 2025)

2. ***Gutiérrez, E.M.**; Cook, W.; Radice, D.; Bernuzzi, S.; Fields, J.; Hammond, P.; Daszuta, B.; Bandyopadhyay, H.; Jacobi, M.
   Magnetic Field Configurations in Binary Neutron Star Mergers I: Post-merger Remnant and Disk
   arXiv:2506.18995 (**accepted** in Phys. Rev. D, 2025)

3. Daszuta, B.; Cook, W.; Hammond, P.; Fields, J.; **Gutiérrez, E.M.**; Bernuzzi, S.; Radice, D.
   Numerical relativity simulations of compact binaries: comparison of cell- and vertex-centered adaptive meshes
   Phys. Rev. D, 112, 103006 (2025)

4. **Gutiérrez, E.M.**; Bhattacharya, M.; Radice, D.; Murase, K.; Bernuzzi, S.
   Cocoon shock breakout emission from binary neutron star mergers
   Phys. Rev. D, 111, 063031 (2025)

5. Porter, K.; Noble, S.C.; **Gutiérrez, E.M.**; Pelle, J.; Campanelli, M.; Schnittman, J.; Kelly, B.
   A Parameter Study of the Electromagnetic Signatures of an Analytical Mini-Disk Model for Supermassive Binary Black Hole Systems
   ApJ, 979, 2 (2025)

6. ***Gutiérrez, E.M.**; Combi, L.; Romero, G.E.; Campanelli, M.
   Non-thermal radiation from dual jet interactions in supermassive black hole binaries
   MNRAS, 532, 1, 2024

7. **Gutiérrez, E.M.**; Combi, L.; Ryan, G.
   Accretion onto binary black holes
   arXiv:2405.14843 (Invited chapter for the edited book *"New Frontiers in GRMHD Simulations"* (Eds. C. Bambi, Y. Mizuno, S. Shashank, and F. Yuan; Springer Singapore, expected in Dec 2024)

8. Combi, L.; Yang, H.; **Gutiérrez, E.M.**; Noble, S.C.; Romero, G.E.; Campanelli, M.
   General relativistic magnetohydrodynamical simulations of accretion flows through traversable wormholes
   Phys. Rev. D, 109, 103034 (2024)

9. Zubieta, E.; Missel, R.; Sosa Fiscella, V.; Lousto, C.O.; del Palacio, S.; López Armengol, F.G.; García, F.; Combi, J.A.; Wang, L.; Combi, L.; Gancio, G.; Negrelli, C.; **Gutiérrez, E.M.**
   First results of the glitching pulsar monitoring programme at the Argentine Institute of Radioastronomy
   MNRAS, 521, 3 (2023)

10. ***Gutiérrez, E.M.**; Combi, L.; Noble, S.C.; Campanelli, M.; Krolik, J.H.; López Armengol, F.G.; García, F.
    Electromagnetic Signatures From Supermassive Binary Black Holes Approaching Merger
    ApJ, 928, 137 (2022)

11. Lousto, C.O.; Missel, R.; Prajapati, H.; Sosa Fiscella, V.; López Armengol, F.G.; Gyawali, P.K.; Wang, L.; Cahill, N.; Combi, L.; del Palacio, S.; Combi, J.A.; Gancio, G.; García, F.; **Gutiérrez, E.M.**; Hauscarriaga, F.

Vela Pulsar: Single Pulses Analysis with Machine Learning Techniques
MNRAS, 509, 4 (2021)
Contribution: Progamming of some routines and data management.

12. Sosa Fiscella, V.; del Palacio, S.; Combi, L.; Lousto, C.O.; Combi, J.A.; Gancio, G.; García, F.; **Gutiérrez, E.M.**; Hauscarriaga, F.; Kornecki, P.; López Armengol, F.G.; Mancuso, G.C.; Muller, A.L.; Simaz Bunzel, A.
PSR J0437-4715: The Argentine Institute of Radioastronomy 2019-2020 Observational Campaign
ApJ, 908, 158 (2021)
Contribution: Progamming of some routines and data management.
13. **Gutiérrez, E.M.**; Vieyro, F.L.; Romero G.E.
Nonthermal processes in hot accretion flows onto supermassive black holes: An inhomogeneous model
A&A, 649, A87 (2021)
14. Romero, G.E.; **Gutiérrez, E.M.**
The Origin of Matter at the Base of Relativistic Jets in Active Galactic Nuclei
Universe, 6(7), 99 (2020)
15. **Gutiérrez, E.M.**; Romero, G.E.; Vieyro, F.L.
Cosmic rays from the nearby starburst galaxy NGC 253: the effect of a low luminosity active galactic nucleus
MNRAS, 494, 2 (2020)
16. **Gutiérrez, E.M.**; Nemmen, R.; Cafardo, F.
*A Nonthermal Bomb Explains The Near-infrared Superflare of Sgr A**
ApJL, 891, 2, L36 (2020)
17. Gancio, G.; Lousto, C.O.; Combi, L.; del Palacio, S.; López Armengol, F.G.; Combi, J.A.; García, F.; Kornecki, P.; Muller, A.L.; **Gutiérrez, E.M.**; Hauscarriaga, F.; Mancuso, G.C.
Upgraded antennas for pulsar observations in the Argentine Institute of Radio astronomy
A&A, 633, A84 (2020)
Contribution: Programming of some routines and data management.
18. Pérez, D.; Romero, G.E.; Combi, L.; **Gutiérrez, E.M.**
A note on geodesics in inhomogeneous expanding spacetimes
Class. Quantum Grav., 36, 5 (2019)
19. **Gutiérrez, E.M.**; Vieyro, F.L.; Romero, G.E.
Primordial black hole evolution in two-fluid cosmology
MNRAS, 473, 4 (2018)

Conference proceedings

- **Gutiérrez et al.**, Radiation from hot accretion flows, BAAA, Vol. 61 (2019)
- **Gutiérrez et al.**, A gas of cosmological black holes, BAAA, Vol. 60 (2018)

Publications in prep.

- **Gutiérrez et al. 2025**, Inferring M87* properties from the multiscale modeling of its broadband emission
- **Gutiérrez et al. 2025**, Production of large-scale magnetic fields during the merger of neutron stars
- **Gutiérrez et al. 2025**, Kinematic and dynamic electromagnetic signatures in close supermassive black hole binaries