GIULIA CERINI

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Work Experience

NASA Postdoctoral Fellow   **Pasadena, CA (USA)**
Anticipated Start Date: 09/20/2024

- Project description: Weak Gravitational Lensing and Galaxy Clustering as Probes of Dark Matter and Dark Energy
- Advisor: Jason Rhodes

Education

University of Miami   **Coral Gables, FL (USA)**
Ph.D., Award of Academic Merit   *2019 - 2024*

- Thesis title: Baryons as tracers of dark matter in large scale structures
- Supervisor: Nico Cappelluti

University of Miami   **Coral Gables, FL (USA)**
M.Sc., Award of Academic Merit   *2019 - 2021*

Sapienza University   **Rome (Italy)**
M.Sc. in Astronomy and Astrophysics, Summa Cum Laude   *2017 - 2019*

- Thesis title: The early growth of supermassive black holes: dynamical interactions and black hole mergers in the early universe
- Supervisor: Raffaella Schneider

Sapienza University   **Rome (Italy)**
B.Sc. in Physics, 110/110   *2005 - 2009*

- Thesis title: The cosmological principle and the homogeneous isotropic metrics
- Supervisor: Paolo de Bernardis.

Research Area

My research primarily centers on the field of X-ray astrophysics, with a special focus on large-scale structures, in particular galaxy clusters, which we use as probes for cosmology and dark matter, and cosmic X-ray background. In the past years, my research was also involved in the development of models concerning the formation and evolution of early supermassive black holes and active galactic nuclei.

Research Publications and Preprints

- G. Cerini, N. Cappelluti, M. Galeazzi, and E. Ursino, "Evidence of X-ray emission from the warm hot intergalactic medium" 2023. arXiv: 2307.14411 [astro-ph.CO].

- G. Cerini, N. Cappelluti, and P. Natarajan, "New metrics to probe the dynamical state of galaxy clusters" The Astrophysical Journal, vol. 945, no. 2, p. 152, Mar. 2023., doi: 10.3847/1538-4357/acbccb.

- R. Valiante, M. Colpi, R. Schneider, et al., "Unveiling early black hole growth with multifrequency gravitational wave observations", vol. 500, no. 3, pp. 4095–4109, Jan. 2021., doi: 10.1093/mnras/staa3395. arXiv: 2010.15096 [astro-ph.GA].

Papers in Preparations

- G. Cerini, E. Bellomi, N. Cappelluti, S. Khizroev, E. Lau, P. Natarajan, J. ZuHone., "Revisiting galaxy cluster scaling relations through dark matter-gas coherence".

- G. Cerini, N. Cappelluti, S. Khizroev, P. Natarajan, "Mass-gas coherence analysis of HSTFF and CLASH clusters".

Grants

- 2024: NASA Astrophysics Data Analysis Program (ADAP) Science PI grant, "Probing the dynamical state of galaxy clusters with NASA archival data", proposal number 23-ADAP23-0073

- 2022: NASA Chandra Cycle 24 PI grant, "New metrics to probe the dynamical state of galaxy clusters", proposal number 24800348.

Conference Presentations

Selected Invited Talks

- February 2024: "Novel metrics for exploring the dynamical state and evolution of galaxy clusters, and their influence on cosmology", Florida International University, Miami, FL (USA)

- October 2023: "Revisiting galaxy cluster scaling relations through dark matter-gas coherence", NASA Goddard Space Flight Center, Greenbelt, MD (USA)

- October 2023: "Revisiting galaxy cluster scaling relations through dark matter-gas coherence", University of Maryland, College Park, MD (USA)

- October 2023: "Revisiting galaxy cluster scaling relations through dark matter-gas coherence", California Institute of Technology, Pasadena, CA (USA)

- September 2023: "Revisiting galaxy cluster scaling relations through dark matter-gas coherence", Center for Astrophysics | Harvard & Smithsonian, Boston, MA (USA)

- May 2023: "New metrics to probe the dynamical state of galaxy clusters", Center for Astrophysics | Harvard & Smithsonian, Boston (from remote), MA (USA)

- March 2023: "New metrics to probe the dynamical state of galaxy clusters", Massachusetts Institute of Technology, Boston, MA (USA)

- October 2019: "The early growth of the first early supermassive black holes", International Workshop on Accretion History of AGN, University of Miami, Coral Gables, FL (USA).

Contributed Talks in Conferences

- March 2023: "Emission detection of the Warm Hot Intergalactic Medium", 20th meeting of the high energy astrophysics division of the American Astronomical Society, Waikoloa, HI (USA)

- January 2023: "New metrics to probe the dynamical state of galaxy clusters", 241st meeting of the American Astronomical Society, Seattle, WA (USA).

Contributed Posters

- April 2024: "Novel metrics for exploring the dynamical state and evolution of galaxy clusters, and their influence on cosmology", 21st meeting of the high energy astrophysics division of the American Astronomical Society, Horseshoe Bay, TX (USA)

- March 2023: "New metrics to probe the dynamical state of galaxy clusters", 20th meeting of the high energy astrophysics division of the American Astronomical Society, Waikoloa, HI (USA)

- March 2022: "Power spectrum analysis of the Warm Hot Intergalactic Medium", 19th meeting of the high energy astrophysics division of the American Astronomical Society, Pittsburgh, PA (USA).

Teaching and Mentoring

- 2019-2021: Teaching assistant in undergraduate physics laboratories at the Department of Physics of the University of Miami. Topics: elementary mechanics, fluids, waves, optics, thermodynamics.

- 2022-: Supervisor of Young Scholars Program (YSP) student Sabina Khizroev, co-author of the papers "Revisiting galaxy cluster scaling relations through dark matter-gas coherence" and "Mass-gas coherence analysis of HSTFF and CLASH clusters."

Experience

Invited visits

- Visiting student for purposes of collaboration at the Center for Astrophysics | Harvard & Smithsonian, Boston, MA (USA) in May 2024

- Visiting student for purposes of collaboration at the Center for Astrophysics | Harvard & Smithsonian, Boston, MA (USA) in January 2024

- Visiting student for purposes of collaboration at the Center for Astrophysics | Harvard & Smithsonian, Boston, MA (USA) in September 2023.

Websites

- http://agndb.physics.miami.edu. Member of the team that established the spectro-photometric database of all the discovered active galactic nuclei (AGN), known as AGN-DB. The database consists of more than 7 million unique AGN, with properties spanning radio to X-ray wavebands across all redshifts.