





Muñoz Rodríguez Iván

PhD student

 ivanmuro.github.io/  IvanMuro  ivan.rodriguez@noa.gr  0000-0001-7161-4112

SCIENTIFIC PROFILE

In the last 2.5 years of my PhD I have been building up specific expertise in the studies of supermassive black holes (SMBHs), clusters of galaxies and semi-empirical modelling techniques based on N-body cosmological simulations. I have developed a methodology to produce realistic Active Galactic Nuclei (AGN) mock catalogues based on observed X-ray AGN populations. One of the key features of the model is the possibility of implementing selection effects of particular observations which allows a forward comparison between simulations and observations. I am using these catalogues to study the effects of the environment as an AGN-triggering mechanism. I found that the environment plays an important role which also evolves with cosmic time. In the local Universe, AGN activity is suppressed in the densest regions with respect to low-dense environments. However, this relation appears to be reversed for earlier cosmic times, where AGN activity is promoted in high-dense regions with respect to the low-density ones (see publication 2 below). Following this work, I am currently studying the radial distribution of AGN in massive clusters at redshift around 1. I found that current observations of AGN overdensities in the outskirts of massive clusters could be explained just because of projection effects of serendipitous lines of sight, without invoking additional physical processes that enhance AGN activity in these regions. This work is close to being submitted. My previous modelling work has made me realise that there are currently open issues in our understanding of the role of the environment in AGN activity, which however, can be addressed by leveraging state-of-the-art multiwavelength observations of galaxy clusters and my expertise in modelling. This realisation has led to this proposal.

EDUCATION

PHD IN ASTRONOMY | STUDENT

October 2020 – Current | National Observatory of Athens (Greece) and University of Southampton (United Kingdom)

- item1

MSC. IN ASTRONOMY | STUDENT

2019-2020 | University of Granada (Spain)

- item1

BSC IN PHYSICS | STUDENT

2014 – 2019 | University of Salamanca (Spain)

- item1

INTERNATIONAL NETWORK & COLLABORATIONS

EUCLID | PHD STUDENT

2022-current

- Contribution to the characterisation of light cones for WG9.

BID4BEST | ESR

2020-current

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CARMENES | MSc STUDENT

2020-current

- It is an experiment designed for the discovery of exoplanets using the radial velocity method based on optical and near-infrared spectroscopy. I studied the occurrence of exoplanet in CARMENES sample for my MSc thesis

INTERNATIONAL CONFERENCES

- 2023/01/30-02/01 “VI Meeting of AGN Research in Spain in the Era of the New Observatories” (contributed talk)

- 2022/09/28-29 “What Drives the Growth of Black Holes”, 20-30 September 2022 in Reykjavík, Iceland (poster + spotlight talk)
- 2022/09/05-09 “XV Reunión científica de la Sociedad Española de Astronomía”, 5-9 September 2022 in Tenerife, Spain (poster)
- 2022/07/16-24 “44th COSPAR Scientific assembly”, 16-24
- July 2022 in Athens, Greece, Symposium E1.7 “Properties and Evolution of Active Galactic Nuclei in Galaxy Clusters” (contributed talk)
- 2022/06/27-07/01 “European Astronomical Society annual meeting 2022”, June 27-July 01 2022 in Valencia, Spain, Session S5e: “Towards the next generation of X-ray surveys with Athena” (contributed talk)

INVITED TALKS & SEMINARS

- 2023/05/22 Joy of Hydrosims (USM/LMU, Munich)
- 2023/02/06 IAC AGN talks (IAC, Tenerife)
- 2023/02/02 Theoretical physics and astronomy group (UGR, Granada)
- 2022/11/25 FAME (INAF, Bologna)
- 2022/07/06 AGN coffee (ESO, Garching)
- 2022/06/21 ESO lunch talk (ESO, Garching)
- 2022/05/30 Southampton Monday Seminar (University of Southampton, Southampton)
- 2022/05/12 Kaffeerunde (MPE, Garching)

OUTREACH

- 2022-today Podcast “Pilgrims of the Kosmos”
- September 2022 Article in “Astronomia”
- July 2022 Hellenic astronomical society: HIPPARCHOS | Volume 3, Issue 5 pages 17-21 (co-author)
- Summer 2019-2021-2022 Support astronomer in Centro Astronomico de Tiedra

AWARDS & FOUNDRING

- 2020-today Ph.D. Marie Curie Research Fellow. Early Stage Researcher of the H2020 Marie Skłodowska-Curie Innovative Training Network “Big Data analytics for Black hole Evolution Studies” (BiD4BEST, grant agreement No 860744)

PUBLICATIONS

1. **Muñoz Rodríguez, I.**, Georgakakis, A., Shankar, F., et al. (in prep.). Radial distribution of Active Galactic Nuclei in massive clusters: Simulations versus observations.
2. **Muñoz Rodríguez, I.**, Georgakakis, A., Shankar, F., et al. (2023). Cosmic evolution of the incidence of Active Galactic Nuclei in massive clusters: Simulations versus observations. Monthly Notices of the Royal Astronomical Society, 518(1), 1041-1056.
3. Amado, P. J., Bauer, F. F., Rodríguez López, C., Rodríguez, E., Cardona Guillén, C., Perger, M., Caballero, J. A., López-González, M. J., **Muñoz Rodríguez, I.** et al., “The CARMENES search for exoplanets around M dwarfs. Two terrestrial planets orbiting G 264-012 and one terrestrial planet orbiting Gl 393”, Astronomy and Astrophysics, vol. 650, 2021. doi:10.1051/0004-6361/202140633.
4. Sabotta, S. Schlecker, M., Chaturvedi, P., Guenther, E. W., **Muñoz Rodríguez, I.** et al., “The CARMENES search for exoplanets around M dwarfs. Planet occurrence rates from a subsample of 71 stars”, Astronomy and Astrophysics, vol. 653, 2021. doi:10.1051/0004-6361/202140968.