Hossam Khalil

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Education

PhD in Astrophysics, University of Helsinki (UH), Finland — Jan 2025 -Present
Working Title: *Improving cosmological constraints from large-scale structure in the era of eROSITA and Euclid*
Supervisor: Alexis Finoguenov

M.Sc. in Astrophysics, University of Helsinki (UH), Finland — Sep 2022–Jun 2024
Title: *AXES-2MRS: A new all-sky catalogue of extended X-ray galaxy groups*
Supervisor: Alexis Finoguenov

B.Sc. in Physics, University of Science & Technology at Zewail City (UST), Egypt — Sep 2015–Jul 2019

Grants & Fellowships

Astrophysics Centre for Multimessenger studies in Europe (ACME) Travel Grant
Research visit to the University of Geneva — Sep 2025

University of Helsinki Travel Grant
Research visit to the University of Geneva — Jun 2025

The Vilho, Yrjö and Kalle Väisälä Foundation of the Finnish Academy of Science and Letters Grant
Six-month working grant (EUR 13,500). Declined in favour of a PhD employment contract — Jan 2025

University of Helsinki Scholarship Full M.Sc.tuition-fee waiver (EUR 30,000) — 2022–2024

Publications

- **Khalil, H.,**, Finoguenov, A., Tempel, E., and Mamon, G. A. 2025. *AXES-2MRS: A new all-sky catalogue of extended X-ray galaxy groups.* A&A, 690, A212 [arXiv]
- Eckert, D., Seppi, R., **Khalil, H.,** et al. 2025. *The impact of strong feedback on galaxy group scaling relations.* A&A, 701, A127 [arXiv]
- Seppi, R., Eckert, D., **Khalil, H.,** et al. 2026. *Bound or blown: the fate of hot gas in galaxy groups.* A&A submitted [arXiv]

Teaching

Teaching assistant – Department of Physics, University of Helsinki — 2025–Present

- **PAPU-105** Project leading in observational astronomy
- **FYS2045** Basics of Observational Astronomy II

Research Experience

Master Thesis — Jun 2024
Department of Physics at University of Helsinki (Supervisor: Alexis Finoguenov) — Helsinki, Finland

- Released a new all-sky catalogue of X-ray detected groups (AXES-2MRS) by identifying extended X-ray sources in the ROSAT all-sky survey with the 2MRS optical group catalogue. Performed X-ray analysis on a subset observed by XMM-Newton to study the baryonic properties of these groups through X-ray–optical scaling relations.

Research Trainee Sep 2023 - Jan 2024
Helsinki Institute of Physics & Department of Physics at UH (Supervisor: David J. Weir) Helsinki, Finland

- Analyzed the NANOGrav 15-year data set to constrain the parameters of a stochastic gravitational wave background signal from a first-order phase transition using `PTArcade`.

Nordic Optical Telescope (NOT) Remote Observing School Oct 2022
University of Helsinki and University of Turku Turku, Finland

- Conducted optical observations of nearby galaxy groups using the NOT in La Palma.
- Carried out the observation preparation, spectral reduction, and redshift analysis to complete cluster surveys.

Zwicky Transient Facility (ZTF) Summer School Jul 2022
University of Minnesota and Caltech *online*

- Performed multi-messenger astrophysics analysis tasks including transient detection in ZTF datasets and optical follow-ups to neutrino (IceCube) and gravitational wave (LIGO & VIRGO) alerts.

Research Trainee in High Energy Astrophysics Aug 2017 - Jan 2018
UST at Zewail City (Supervisor: Alaa Ibrahim) Giza, Egypt

- Studied different types of bursts from a radio-emitting magnetar and performed spectral fitting to model the emission region properties.

Professional Experience

Physics Teaching Assistant Sep 2020 - Jun 2022
UST at Zewail City Giza, Egypt

- Supervised 50+ students in PEU 327 (Observational Astrophysics Lab) and PEU 450 (Computational Physics).
- Delivered online and in-person lectures, graded assignments, and provided one-on-one support clinics.

Data Analyst Jan 2020 - Jan 2021
EV Mobility (Mansour Group) Cairo, Egypt

- Worked in the R&D department, contributing to a project that aimed at introducing electric micromobility solutions to Egypt.
- Analyzed the global electric micromobility scene, conducted market analysis, and provided recommendations that had high-level business consequences.

Scientific Language Editing Trainee Aug 2019 - Jan 2020
Natural Sciences Publishing Giza, Egypt

- Worked as a trainee in the Applied Mathematics & Information Sciences Journal and Journal of Statistics Applications & Probability.

Skills

Astrophysics Software	SAS, eSASS, HEASoft, PTArcade, Xspec, IRAF, CARTA, TOPCAT
General Programming Languages	Python, Mathematica, MATLAB
Other Software	MS Office, Adobe Photoshop
Languages	Arabic (Native speaker), English (Fluent), Finnish (Beginner)

REFERENCES ARE AVAILABLE UPON REQUEST