

Mohamed H. Abdullah Elhashash

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16 Publications

h-index: 10

350+ citations



Research Summary: Observational cosmologist specializing in galaxy clusters, large-scale structure, and galaxy evolution. Developer of the FoG-GalWeight toolkit for spectroscopic surveys, enabling precise cluster identification, membership determination, dynamical analyses, and robust cosmological constraints. Research integrates observations, statistical modeling, and simulations to address fundamental questions in cosmology and to reveal the processes shaping galaxy evolution in dense environments. Dedicated to fostering inclusive STEM communities through mentorship and support of underrepresented groups.

Education

- 2020 Ph.D., Physics & Astronomy, University of California, Riverside, USA
- 2010 M.Sc., Astronomy, Cairo University, Egypt
- 2004 B.Sc., Physics & Astronomy, Cairo University, Egypt

Academic Appointments

- 2024–Present Postdoctoral Scholar, University of California, Merced, USA
- 2021–2023 JSPS Postdoctoral Fellow, Chiba University, Japan
- 2014–2020 Teaching Assistant, University of California, Riverside, USA
- 2010–2014 Research Assistant, National Research Institute of Astronomy and Geophysics (NRIAG), Egypt
- 2005–2010 Assistant Researcher, NRIAG, Egypt

Honors & Awards

- 2021 JSPS Prestigious Postdoctoral Fellowship
- 2021 JSPS KAKENHI Grant-in-Aid for Scientific Research
- 2019 Dissertation Year Program Fellowship, UC Riverside
- 2019 Travel Grant, University of California, Riverside, CA
- 2016 Travel Grant, University of California, Riverside, CA

- 2014 Dean's Distinguished Fellowship, UC Riverside
- 2014 Scholarship from the Egyptian Government to the New Mexico State University, NM

Teaching Experience

- Teaching Assistant, UC Riverside
- General Physics Laboratory, General Physics
- Classical Mechanics, Electrodynamics
- Exploring the Universe, History of the Universe

Academic Supervision

- 2025 Ph.D., University of California Merced — Observational Cosmology and Dynamics of Galaxy Clusters
- 2024 M.Sc., Cairo University — Dynamics of Coma Cluster Galaxies
- 2024 M.Sc., Cairo University — VIPERS High- z Cluster Dynamics
- 2023 M.Sc., Cairo University — Dynamical Properties of Galaxy Clusters in Uchuu Simulations
- 2022 Ph.D., Al-Azhar University — Galaxy Evolution & Environment
- 2021 Ph.D., Cairo University — Galaxy Properties & Field Theories

Research Areas

- Dynamics of galaxy clusters; redshift-space distortions
- Cluster mass function; correlation function; baryon acoustic oscillations
- Cosmological parameter constraints
- Environmental effects; galaxy–halo connection, stellar mass function
- Cosmological N-body simulations; generating mock catalogs

Technical Skills

- Python, MATLAB, Mathematica, TOPCAT
- L^AT_EX, Microsoft Office
- Statistical modeling, MCMC, Bayesian inference, MLE, clustering algorithms

Talks, Workshops & Conferences

- 2024 — Invited Colloquium Speaker, UC Merced
- 2023 — Organizer & Lecturer, Middle-East and Africa School on Large Galaxy Surveys for Cosmology
- 2022 — Visiting Researcher, Instituto de Astrofísica de Andalucía (CSIC), Spain
- 2022 — Talk, *Galaxy Clusters 2022: Challenging Our Cosmological Perspectives*, STScI, USA
- 2022 — Talk, Galaxy Evolution Workshop, Japan–Taiwan–Korea communities, Japan

Publications

1. **Mohamed H. Abdullah**, et al. (2025). *From the Densest Clusters to the Emptiest Voids: No Evidence For Environmental Effects on the Galaxy Size–Mass Relation at Low Redshift*. Submitted to ApJ.
2. Shrouk Abdulshafy, et al. (2025). *Dynamical Properties and Velocity Dispersion–Mass Relation of $z \sim 1$ Galaxy Clusters from the GOGREEN and GCLASS Surveys*. Submitted to ApJ.
3. **Mohamed S. Khan**, et al. (2025). *The Fluctuation Theory, Critical Phenomena and Gravitational Clustering of Galaxies*. Accepted for publication in the Journal of Astrophysics and Astronomy.
4. **Mohamed H. Abdullah**, et al. (2025). *Quantifying the Velocity Anisotropy Profile of Galaxy Clusters Using the Uchuu Cosmological Simulation*, *ApJ*, 987, 70.
5. C. A. Dong-Paez, et al. (2024). *The Uchuu–SDSS galaxy light-cones: a clustering, redshift space distortion and baryonic acoustic oscillation study*, *MNRAS*, 528, 7236.

- 2020 — Participant, Data Science and Visualization Workshop, University of California, Riverside, USA
- 2018 — Participant, GalFRESKA: Galaxy Formation and Evolution Workshop, Caltech, Pasadena, CA, USA
- 2014 — Participant, Observational Astronomy Workshop, Lick Observatory, Mt. Hamilton, CA, USA
- 2012 — Talk, Arabic Conference of Astronomy & Geophysics-2, NRIAG, Egypt
- 2012 — Participant, Summer School & Workshop on Cosmology and Large-scale Structure, ICTP, Italy
- 2012 — Participant, International Cosmology School, ICTP/SAAO/PI, Cape Town, South Africa
- 2010 — Talk, Arabic Conference of Astronomy & Geophysics-1, NRIAG, Egypt
- 2008 — Participant, School of X-ray: Space Astrophysics with NASA/ESA Missions, Alexandria, Egypt

Press & Media

- 2023 — *Most of the Universe Composed of Dark Energy* ([ucm.edu](https://www.uci.edu))
- 2020 — *Scientists Precisely Measure the Total Amount of Matter in the Universe* (news.ucr.edu)
- 2020 — *Top 10 Non-COVID Science Stories of 2020* ([universityofcalifornia.edu](https://www.universityofcalifornia.edu))

11. **Mohamed H. Abdullah**, et al. (2020). *Cosmological Constraints on Ω_m and σ_8 from Cluster Abundances Using the GalWCat19 Optical-Spectroscopic SDSS Catalog*. ApJ, 901, 90.
12. **Mohamed H. Abdullah**, et al. (2020). *GalWeight Application: A Publicly Available Catalog of Dynamical Parameters of 1800 Galaxy Clusters from SDSS-DR13 (GalWCat19)*. ApJS, 246, 2.
13. J. C. C. Chan, et al. (2019). *The Rest-frame H-band Luminosity Function of Red Sequence Galaxies in Clusters at $1.0 < z < 1.3$* . ApJ, 880, 119.
14. **Mohamed H. Abdullah**, et al. (2018). *GalWeight: A New and Effective Weighting Technique for Determining Galaxy Cluster and Group Membership*. ApJ, 861, 224.
15. Mohammad Khan, et al. (2014). *A Comparison Between Observed and Analytical Velocity Dispersion Profiles of 20 Nearby Galaxy Clusters*. Ap&SS, 351, 289.
16. E. A. Praton & **Mohamed H. Abdullah** (2014). *Tilted Infall Regions*. AAS Meeting Abstracts #223, 457.14.
17. **Mohamed H. Abdullah**, et al. (2013). *Distortion of Infall Regions in Redshift Space-I*. MNRAS, 434, 1989.
18. **Mohamed H. Abdullah**, et al. (2011). *Studying the Dynamical Properties of 20 Nearby Galaxy Clusters*. MNRAS, 416, 2027.
19. **Mohamed H. Abdullah**, et al. (2010). Optical Mass Estimates of the Galaxy Clusters: A117, A1663, and A2670. Proceedings of the 2nd Arab Conference of Astronomy and Geophysics, Cairo, Egypt.

References

- Prof. Gillian Wilson — gillian.wilson@ucr.edu
- Prof. Anatoly Klypin — aklypin8@gmail.com
- Prof. Elizabeth Praton — epraton@fandm.edu
- Prof. Tomoaki Ishiyama — ishiyama@chiba-u.jp