Eda Gjergo, Ph.D.

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Research interests

Galactic chemical evolution, dust modeling, cosmological simulations, interstellar and intracluster medium, supernova cosmology, dark energy models.

Current employment

Nanjing University — Nanjing, China
Postdoctoral Scholar in Astronomy — Sep 2022 – Present

Past employment

Wuhan University — Wuhan, China
Postdoctoral Scholar in Physics — Oct 2019 – Aug 2022

INAF Trieste Observatory — Trieste, Italy
Research Assistant — Oct 2015 – May 2019

Argonne National Laboratory — Lemont, IN
Junior Team Member — Sep 2011 – Aug 2015

Sperling & Kupfer — Milan, Italy
Outreach author — Jul 2005 – Jul 2007

Education

Università degli Studi di Trieste — Trieste, Italy
PhD in Physics — Graduated in Spring 2019

Illinois Institute of Technology (IIT) — Chicago, IL
BS in Physics — Graduated in Spring 2014

Illinois Institute of Technology (IIT) — Chicago, IL
BS in Applied Mathematics — Graduated in Spring 2014

United World College (UWC) — Duino, Italy
International Baccalaureate (IB diploma programme) — Spring 2008

Research and Work experience

Galactic Chemical Evolution at Nanjing University — Sep '22 – Present
Working on expanding my public code GalCEM to inhomogeneous galactic environments. Investigating the impact of a variable IMF to the chemical evolution of galaxies.

Galactic Chemical Evolution at Wuhan University — Oct '19 – Present
Developed a comprehensive modular Python package that computes the one-zone chemical evolution of galaxies in various environments (GalCEM). Currently applying it to the analysis of large databases of Galactic stellar abundances.

INAF Astronomical Observatory of Trieste (Italy) Nov '15 – Sept '19
Adapted a one-zone dust evolution model to cosmological zoom-in simulations of galaxy clusters. • Became comfortable with running and editing complex parallel codes designed for supercomputers. • Developed a post-processing analysis package written in `Python` to extract and manipulate the simulation's data across cosmic history. • Wrote an algorithm to trace the evolution history of individual gas particles, as well as special subsets of the simulated particles across cosmic time. • Wrote automated python scripts to submit my post-processing routines to the supercomputer's queue, on top of the standard queuing procedure.

By integrating chemical evolution models over luminosity functions, shown that minor galaxies or filamentary structures $\sim$ 1 dex smaller than the break of the Schechter functions cannot be major sources of galaxy cluster dust.

Through the post-processing radiative transfer analysis of cosmological zoom-in simulations of galaxies, analyzed spectral properties relevant to infrared surveys (i.e., SPICA).

Argonne National Laboratory, (Chicago, IL) Sept '11 – May '15
Aided to the coding the analysis framework of upcoming observations for the Dark Energy Survey (DES). Specifically, we improved the Figure of Merit by including the systematic error for core collapse supernovae.

Provided, on behalf of the DESC supernova group, the filter analysis of the candidate filter vendors able to meet LSST's specifications. The study played a major role in the vendor choice by the LSST committee.

Explored alternatives to dark energy: selected a model for quintessence and a model for modified gravity, and evaluated the constraints to three supernova data sets.

Sperling & Kupfer, branch of Mondadory, Milan, Italy July '06 – Apr '07
Co-authored a best-seller book for the general public on the fundamental forces of physics, with renowned Italian astrophysicist Margherita Hack.

The book ranked #10 as an overall national bestseller, and #2 for the non-fiction category. It won *Frascati Scienza: La Scienza per Tutti, 2010*, an award selected jointly by 4 National Institutes of Physics in Italy.

Summer Science Program June '07 – Aug '07

Calculated the orbit of a near-earth asteroid by collecting data from photographic plates and CCD optical images on telescopes. Used spherical trigonometry and Python for orbit computation and submitted the observations to the Minor Planet Center.

Sponsored by the California Institute of Technology, Stanford University, Harvey Mudd College, UCLA, and NASA's Jet Propulsion Laboratory. Competitive admission with a 17% acceptance rate.

Accepted Publications

First detection of CO isotopologues in a high-redshift main-sequence galaxy: evidence of a top-heavy stellar initial mass function
Guo Z.-Y., et al.
Accepted by ApJ (2024)

α-enhanced Astrochemistry: The Carbon cycle in extreme galactic conditions
Bisbas T. G., Zhang Z.-Y., Gjergo E., et al. (2024)
Monthly Notices of the Royal Astronomical Society, Volume 527, Issue 3, pp.8886-8906

Correction to: An analytical description of the evolution of binary orbital-parameter distributions in N-body computations of star clusters
Kroupa P., Wang Y., Gjergo E. (2023)
Monthly Notices of the Royal Astronomical Society, Volume 526, Issue 4, pp.5777-5777

Assessing stellar yields in Galaxy chemical evolution: Observational stellar abundance patterns
Liang J., Gjergo E., Fan X. (2023)
Monthly Notices of the Royal Astronomical Society, Volume 522, Issue 1, pp.863-884

GalCEM I: An Open-source Detailed Isotopic Chemical Evolution Code
Gjergo E., et al. (2023)
The Astrophysical Journal Supplement Series, Volume 264, Issue 2, id.44, 22 pp.

LAMOST meets Gaia: The Galactic open clusters
Fu X., et al. (2022)
Astronomy & Astrophysics, Volume 668, id.A4, 16 pp.

The MAGPI Survey - science goals, design, observing strategy, early results and theoretical framework
Foster, Mendel, Lagos, Wisnioski, Yuan et al. (2021)
Publications of the Astronomical Society of Australia, 2021, Volume 38, article id. e031

On the origin of dust in galaxy clusters at low-to-intermediate redshift
Gjergo, Palla, Matteucci, Lacchin, Biviano, Fan (2020)

Monthly Notices of the Royal Astronomical Society, Volume 493, Issue 2, p.2782-2792.

Dust evolution in galaxy cluster simulations
Gjergo, Granato, Murante, Ragone-Figueroa, Tornatore, Borgani (2018)
Monthly Notices of the Royal Astronomical Society, Volume 479, Issue 2, p.2588-2606.

Analytic photometric redshift estimator for Type Ia supernovae from the Large Synoptic Survey Telescope
Wang, *Gjergo*, Kuhlmann (2015)
Monthly Notices of the Royal Astronomical Society, Volume 451, Issue 2, p.1955-1963.

Type Ia supernovae selection and forecast of cosmology constraints for the Dark Energy Survey
Gjergo, Duggan, Cunningham, Kuhlmann, Biswas, Kovacs, Bernstein, Spinka (2013)
Astroparticle Physics, Volume 42, p. 52-61.

Proceedings

The many tensions with dark-matter based models and implications on the nature of the Universe
Kroupa P., *Gjergo E.*, et al.;
Proceedings of Corfu2022: Workshop on Tensions in Cosmology, 2023.

Skills

Programming
Proficient in: **Python**, C, Mathematica.
Familiar with: MATLAB, C++, IDL, Fortran90/77.
Specialized software: GADGET-2/3, CosmoMC, SNANA, SNCosmo
Editor/Misc.: Emacs, Vi, SVN, TotalView, Anaconda.
Markup: HTML/CSS, LaTeX

Languages
(native) Italian, English, Albanian. (HSK 2) Chinese

Honors and scholarships

National Institute of Astrophysics Fellowship (INAF)	2015-2018
Chambliss Astronomy Achievement Student Award (AAS)	2013
Merit-based International Scholarship (IIT)	2008-2014
Italian Ministry of Foreign Affairs Full Scholarship (UWC) (3.5% acceptance rate)	2006-2008
Winner of the Frascati Scienza Award	2010

Mentoring

Jin-Ning LIANG, Wuhan University undergraduate –> Durham University graduate student	2021-2023
Run-Dong YU, Nanjing University undergraduate –> Johns Hopkins University graduate student	2022-2023

	Zi-Hao LIN, Nanjing University undergraduate –> Nanjing University graduate student. Earned a top-tier grade and a 10,000 RMB research prize for his undergraduate research	2022-2023
	Hao-Yang LI, Nanjing University Undergraduate	2024-
Service and outreach	Non-fiction bestseller *Così Parlano Le Stelle*	Apr '07
	YouTube Astrophysics Outreach: TheCosmicWeb	Dec '12 – Feb '14