Sina Taamoli

⌂ Personal Page | in Linkedin | ✉ sina.taamoli@email.ucr.edu | UCR profile | ⦿ ORCID

SUMMARY

Specialized in identifying Large-Scale Structures (LSS) in galaxy surveys and analyzing their impact on galaxy evolution using Machine Learning techniques and statistical methods. Skilled in observing with Keck-MOSFIRE/DEIMOS instruments, performing data reduction, and spectral analysis, as well as reducing and analyzing JWST-NIRSpec IFU spectroscopy data.

Interests: ○ *Large Scale Structures*   ○ *High-redshift galaxies*   ○ *AI Applications in Astronomy*

EXPERIENCE

- **University of California, Riverside** *(2020-present)*   Riverside, CA

  - **Cosmic Web in COSMOS2020 data:** Identified cosmic web components using Multi-Scale Morphology Filter (MMF) and Convolutional Neural Networks (CNN).
  - **Applied Dimensionality Reduction Techniques (Self-Organizing Maps)** to explore interconnections between galaxies' environmental density, physical properties, and observational features.
  - **JWST/NIRSpec IFU Spectroscopy - Morphological Analysis of targets:** Analyzed $z > 7$ galaxies' morphological features (size & Sersic index) as a function of wavelength (GO2659).
  - **X-ray groups across the Cosmic Web:** Generated environmental density catalog of X-ray groups within the COSMOS field and examined their distribution across diverse environments.
  - **COSMOS2020-Environmental Density Catalog:** Generated density maps/catalogs of galaxies in COSMSO2020 survey using weighted Kernel Density Estimator.
  - **Lensing Clusters in Euclid Data:** Performed photometry, SED fitting, and cataloging of ∼250k galaxies around Abell2764 and conducted search for rare UV-bright galaxies at $z \sim 6 - 8$.
  - **Dynamics of Star-forming Galaxies in dense Environments** Performed SED fitting on a sample of galaxies in high-z protocluster environments to extract their dynamical properties.
  - **The FARMER - Profile fitting photometry tool:** Tuned the decision-tree parameters to improve the detection of faint-blended sources at high redshift.
  - **Observing Experience**:
    +30 nights with Keck-DEIMOS/MOSFIRE: proficient in observation planning, mask design, and data reduction | *JWST-NIRSpec IFU (GO2659):* skilled in STScI data reduction pipelines.
  - **Teaching**: "Data Science", "Machine Learning", "Data Visualization and Computer Graphics"

- **Sharif University of Technology** *(2012-2019)*   Tehran, Iran

  - Statistics of Dark Matter Distribution through Peak Theory, Excursion Set Approach, and spherical contact distribution

- **Institute for Research in Fundamental Sciences (IPM)** *(Feb-July 2019)*   Tehran, Iran

  - Internship at Iran National Observatory (INO): Aberration analysis due to structural deformations

EDUCATION

- **University of California, Riverside**   Riverside, CA
  - Ph.D. in Physics-Observational Astronomy   *Sep 2020 - Aug 2025*
    Thesis: Large Scale Structures & Galaxy Environments - Advisor: Prof. Bahram Mobasher
- **Sharif University of Technology**   Tehran, Iran
  - M.Sc. in Physics-Cosmology   *Sep 2017 - Jul 2019*
  - B.Sc. Dual major in Mechanical Engineering & Physics   *Sep 2012 - Jul 2017*

Skills

Programming: Python, R, C/C++, SQL, JavaScript (Beginner), Bash
Astronomical Tools: DS9/ginga, *Galfit* | *Reduction Pipelines*: Pypeit, Keck-MOSFIRE/DEIMOS DRP & JWST IFU | *photometry tools:* THE FARMER | SED fitting tools: Bagpipes & EAZY
Softwares & Platforms: GitHub, Tableau, Origin, TOPCAT, MATLAB

Collaborations

Hawaii Two-0 | DAWN Survey: Observations (Keck), Data reduction, spectral analysis, and cataloging.
Euclid Consortium: Photometry, SED fitting, and cataloging of Early Release Observations (ERO)
Beasts in the Bubbles (JWST-GO2659): Data reduction, Morphological analysis in NIRSpec IFU.
COSMOS-Web/LSS: Leading COSMOS-Web/LSS analysis and hosting monthly group meetings.

Presentations and Talks

○ Large Scale Structures and Galaxy Environments — National Harbor, MD
  AAS 245th annual meeting Winter 2025 - Dissertation Talk — *Jan 2025*
○ AI-Driven Classification of Galaxy Populations across Cosmic Web — CfA-Harvard, MA
  AstroAI Seminar at CfA — *Dec 2024*
○ COSMOS2020: The Role of Mass and Environment in Galaxy Evolution — Tokyo, Japan
  Annual COSMOS meeting — *July 2024*
○ COSMOS2020: Identification of Large Scale Structures — Rochester (RIT), NY
  Annual COSMOS meeting — *May 2023*

Research Mentorship

○ **Graduate Students**
  - Hossein Hatamnia: Generating density maps and LSS identification in COSMOS-Web, 2025-
  - Samaneh Shamyati: Reducing Keck-MOSFIRE data with Pypeit and spectral analysis, 2025-
  - Negin Nezhad: The role of mass and environmental density in Star Formation Activity, 2024

○ **Undergraduate Students** | California-Hawai'i Astronomy Mentorship Program (CHAMP)
  - Kiana Ejercito: Identification of filaments in COSMOS using `DisPerSE`, 2024
  - Seri Nakamura: Identification of filaments in COSMOS using `SCONCE`, 2024

Outreach and Media

UCR-STEM Summer Camp on Data Science: Taught Python Programming — Summer 2024
Voice of America - Interview on the 2024 Solar Eclipse in the U.S (*in Farsi*) — Spring 2024
UCR-STEM Summer Camp on Data Science: Taught Data Analysis — Summer 2023

Publications (GOOGLE SCHOLAR)

LEAD AUTHOR:

1. **Taamoli, S.**; Nezhad, N.; Mobasher, B. ; et al. The Astrophysical Journal, 977, 263. "COSMOS2020: Disentangling the Role of Mass and Environment in Star Formation Activity of Galaxies at $0.4 < z < 4$"

2. **Taamoli, S.**, Mobasher, B., Chartab, N., et al. The Astrophysical Journal, 966, 18. "Large-scale Structures in COSMOS2020: Evolution of Star Formation Activity in Different Environments at $0.4 < z < 4$"

MAJOR CONTRIBUTION:

1. Scarlata, C. M., Hu, W., Hayes, M. J., **Taamoli, S.**, et al. *Submitted to ApJ- under review.* "Systematic Bias in Measuring Ionizing Radiation Escape Fractions Due to Foreground Large-Scale Structures"

2. *Euclid Collaboration:* Zalesky, L., McPartland, C. J. R., Weaver, J. R., et al. *Submitted to ApJ-under review.* "Cosmic Dawn Survey: DR1 Evolution of the Galaxy Stellar Mass Function Across $0.2 < z < 6.5$ Measured Over 10 Square Degrees"

3. Darvish, B.; Chartab, N.; Sattari, Z. ; **Taamoli, S.**; et al. arXiv: 2410.15177. "Dynamics of Star-forming Galaxies in a Massive Structure at $z \sim 2.2$: Evidence for Galaxy Harassment in high-z Environments"

4. *Euclid Collaboration:* Zalesky, L., McPartland, C. J. R., Weaver, J. R., et al. arXiv:2408.05296. "Euclid Preparation. Cosmic Dawn Survey: Data release 1 multiwavelength catalogues for Euclid Deep Field North and Euclid Deep Field Fornax"

5. *Euclid Collaboration:* McPartland, C. J. R., Zalesky, L., Weaver, J. R., et al. arXiv:2408.05275. "Euclid preparation. The Cosmic Dawn Survey (DAWN) of the Euclid Deep and Auxiliary Fields"

6. *Euclid Collaboration:* Weaver, J. R., **Taamoli, S.**, McPartland, C. J. R., et al. arXiv:2405.13505. "NISP only sources and the search for luminous $z = 6 - 8$ galaxies"

7. *Euclid Collaboration:* Atek, H., Gavazzi, R., Weaver, J. R., et al. arXiv:2405.13504. "Euclid: Early Release Observations – A preview of the Euclid era through a galaxy cluster magnifying lens"

8. Weaver, J., Zalesky, L., Allen, N., **Taamoli, S.**. Astrophysics Source Code Library, record ascl: 2312.016 "The Farmer: Photometry routines for deep multi-wavelength galaxy surveys"

9. Ansari Fard, M., Baghkhani, Z., Ghodsi, L., **Taamoli, S.**, et al. MNRAS, Volume 512, Issue 4, June 2022, Pages 5165–5182, "Structure of cosmic web in non-linear regime: the nearest neighbour and spherical contact distributions"

10. Ansari Fard, M., **Taamoli, S.**, Baghram, S. MNRAS, Volume 489, Issue 1, October 2019, Pages 900–909. "Cosmological filaments in the light of excursion set of saddle points"

COLLABORATIVE CONTRIBUTION:

1. Greta Toni; Ghassem Gozaliasl; et al. *Submitted to ApJ- under review.* On arxiv: "The COSMOS-Web deep galaxy group catalog up to $z = 3.7$"

2. Vihang Mehta; Marc Rafelski; Ben Sunnquist; Harry I. Teplitz; et al. arXiv: 2410.16404. "UVCAN-DELS: Catalogs of photometric redshifts and galaxy physical properties"

3. Nedkova, Kalina V., Rafelski, Marc, Teplitz, Harry I., et al. The Astrophysical Journal, Volume 970, Issue 2, id.188, 20 pp. "UVCANDELS: The Role of Dust on the Stellar Mass–Size Relation of Disk Galaxies at $0.5 \leq z \leq 3.0$"

4. Sun, L., Wang, X., Teplitz, H. I., et al. arXiv:2311.15664. "The Ultraviolet Luminosity Function at $0.6 < z < 1$ from UVCANDELS"

5. Morales, A., Finkelstein, S., Bagley, M., et al. arXiv:2405.20901. "Galaxy Rest-Frame UV Colors at $z \sim 2 - 4$ with HST UVCANDELS"

6. *Euclid Collaboration:* Mellier, Y., Abdurro'uf, Acevedo Barroso, J. A., et al. arXiv:2405.13491. "Euclid. I. Overview of the Euclid mission"

References

Dr. Bahram Mobasher	Dr. Sune Toft	Dr. Jeyhan Kartaltepe
Professor (PhD Advisor)	Professor	Associate Professor
UC-Riverside	Niels Bohr Institute	Rochester Institute of Technology
mobasher@ucr.edu	sune@nbi.ku.dk	jsksps@rit.edu