

# Sina Taamoli

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## SUMMARY

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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 Structure of the Universe* ◦ *Galaxy evolution* ◦ *Galaxy environments*

## EXPERIENCE

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- **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 inter-connections between galaxies' environmental density, physical properties, and observational features.
  - **JWST/NIRSpec IFU Spectroscopy - Morphological Analysis of targets:** Analyzed  $z > 7$  galaxies' morphological features (size & Sérsic 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 COSMOS2020 survey using weighted Kernel Density Estimator.
  - **Lensing Clusters in Euclid Data:** Performed photometry, SED fitting, and cataloging of  $\sim 250k$  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

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- **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

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**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

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[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

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- 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* *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*

## HONORS AND AWARDS

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- Dissertation Completion Fellowship Award (UC-Riverside) Spring/Summer 2025
- Dean's Distinguished Fellowship Award (UC-Riverside) 2020-2021
- Outstanding Teaching Assistant Award (UC-Riverside) 2022

## RESEARCH MENTORSHIP

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- **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

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- [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](#))

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### 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. Murphree, G., **Taamoli, S.**, McPartland, C. J. R., et al. *Submitted to ApJ- under review*. “Hawaii Twenty Square Degree Survey (H20): Spectroscopic Catalog”
2. Ejercito, K., Nakamura, S., **Taamoli, S.**, et al. *Bulletin of the American Astronomical Society, Vol. 57, No. 2*. “Detection of Cosmic Filaments in COSMOS2020 Using DisPerSE”
3. 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”
4. *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”
5. 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”
6. *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”
7. *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”
8. *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”
9. *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”
10. 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”
11. 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”
12. 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. Shahidi, A., Mobasher, B., et al. *Submitted to ApJ- under review*. “Application of Statistical Learning Techniques in Selection of Different Populations of Galaxies”
2. Greta Toni; Ghassem Gozaliasl; et al. *Submitted to ApJ- under review*. On arxiv: “The COSMOS-Web deep galaxy group catalog up to  $z = 3.7$ ”
3. Vihang Mehta; Marc Rafelski; Ben Sunnquist; Harry I. Teplitz; et al. arXiv: 2410.16404. “UVCANDELS: Catalogs of photometric redshifts and galaxy physical properties”
4. 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  $0.5 \leq z \leq 3.0$ ”
5. Sun, L., Wang, X., Teplitz, H. I., et al. arXiv:2311.15664. “The Ultraviolet Luminosity Function at  $0.6 < z < 1$  from UVCANDELS”

6. Morales, A., Finkelstein, S., Bagley, M., et al. arXiv:2405.20901. “Galaxy Rest-Frame UV Colors at  $z \sim 2 - 4$  with HST UVCANDELS”
7. *Euclid Collaboration*: Mellier, Y., Abdurro’uf, Acevedo Barroso, J. A., et al. arXiv:2405.13491. “Euclid. I. Overview of the Euclid mission”