Farnik Nikakhtar

Department of Physics, Yale University – 56 Hillhouse Ave, New Haven, CT
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Professional Positions

Yale University — New Haven, CT, USA

Post-Doctoral Fellow in Astrophysics — 2022 – Present
Mentors: Nikhil Padmanabhan & Marla Geha

Education

University of Pennsylvania — Philadelphia, PA, USA

Ph.D. in Physics & Astronomy – **NSF GRFP Fellow** — 2018 – 2022
Advisors: Ravi K. Sheth & Robyn E. Sanderson
Dual Master's Degree in Statistics, **Wharton School**

Sharif University of Technology — Tehran, Iran

B.Sc. Major in Physics — 2012 – 2017
Advisor: Shant Baghram
B.Sc. Minor in Computer Science

Awards & Honors

Balzan Fellowship, Centre for Cosmological Studies, University of Oxford — 2022
Graduate Research Fellowship, U.S. National Science Foundation (NSF) — 2018 – 2021
GAPSA Research Grant, University of Pennsylvania — 2019
Undergraduate Fellowship, Iran's National Elites Foundation (INEF) — 2012 – 2016
Silver Medalist in Astronomy & Astrophysics Olympiad — 2011

Academic Visits

Institut d'astrophysique de Paris (IAP) — May – July 2022
Balzan Fellow

Center for Computational Astrophysics (CCA) — April – July 2021
Guest Reseacher

Institut d'astrophysique de Paris (IAP) — September 2019
Visiting Graduate Student

Max-Planck Institute for Astrophysics — June – July 2019
Visiting Graduate Student

Department of Physics, Harvard University — October 2017
Visiting Undergraduate Student

Department of Physics and Astronomy, University of Pennsylvania — September 2017
Visiting Undergraduate Student

Collaborations

DESI: Dark Energy Spectroscopic Instrument
SDSS-IV: Sloan Digital Sky Surveys
FIRE Simulation: Feedback In Realistic Environments Simulation

Mentoring

Sasha Safonova, Yale University Ph.D.

Andy Nilipour, Yale University B.Sc.

Jason (Jaemyoung) Lee, University of Pennsylvania Ph.D.

Setareh Foroozan, Sharif University of Technology B.Sc. → University of Waterloo M.Sc.

Arefe Abghari, Sharif University of Technology B.Sc. → University of British Columbia M.Sc.

Teaching

University of Pennsylvania, Department of Physics & Astronomy **Philadelphia, PA, USA**

Teaching assistant: Survey of the Universes (ASTR 001 – Fall 2018)
Cosmology (PHYS 505 – Spring 2019)
Introduction to Astrophysics I (ASTR 211 – Fall 2019, Fall 2020)

Flatiron Institute, Center for Computational Astrophysics **New York City, NY, USA**

Guest Lecturer: Machine Learning in Astronomy (May 2021)

University of Pennsylvania, Wharton School **Philadelphia, PA, USA**

Teaching assistant: Modern Data Mining (STAT 471/571/701 – Spring 2020, Spring 2021)

Sharif University of Technology, Department of Physics **Tehran, Iran**

Guest Lecturer: Nonlinear Structure Formation (January 2020)
Teaching assistant: Cosmology (Spring 2016, Spring 2017)

Computer Skills

Programming languages: Python, R, IDL, C/C++, SQL, Julia

Mathematical Software: Mathematica & Matlab.

Documentation: LaTeX, Git

OS: OSX, Linux (+ Shell scripting, sed & awk, etc.)

Selected Talks

Initiative in Cosmology and Physics of AstroParticles (ICAP) Seminar, IAP 2022

Flatiron Institute, Center for Computational Astronomy, DDA Meeting

UC Berkeley Center for Cosmological Physics, Cosmology Seminar

2021 SDSS Collaboration Meeting 2021

KICP Line Intensity Mapping Workshop

2021 GALAH Science Meeting

SDSS-APOGEE Meeting

DESI Galaxy & Quasar Clustering Meeting

Professional Service

Referee for JCAP (Journal of Cosmology and Astroparticle Physics)
PRD (Physical Review D, American Physical Society)
PRE (Physical Review E, American Physical Society)

Organizing Committee, Ecole de physique des Houches
Optimal transport theory and applications to Physics

List of Publications

18 total refereed/under-review papers Total citations: 230+ h-index=7
11 first/second author papers 2 data release papers 3 conference proceedings

Peer Reviewed Journals

1. *Building an Acceleration Ladder with Tidal Streams and Pulsar Timing*
   Peter Craig, Sukanya Chakrabarti, Robyn E. Sanderson, **Farnik Nikakhtar**
   Submitted to ApJ Letters.
2. *Data-Driven Reconstruction of Stochastic Dynamical Equations based on Statistical Moments*
   Farnik Nikakhtar, Laya Parkavosi, M.R.R. Tabar, Muhammad Sahimi, Klaus Lehnertz, Ulrike Feudel
   Submitted to Physical Review Letters.
3. *Revealing Higher-Order Interactions in High-Dimensional Complex Systems: A Data-Driven Approach*
   M.R.R. Tabar, **Farnik Nikakhtar**, Laya Parkavosi, Amin Akhshi, Klaus Lehnertz, Ulrike Feudel
   Submitted to Physical Review X.
4. *limHaloPT: A Numerical Package for Accurate Modeling of Line Intensity Power Spectrum*
   Azadeh Moradinezhad Dizgah, Alberto Vallinotto, **Farnik Nikakhtar**
   Journal of Open Source Software, vol. 7, issue 75, id. 4173.
5. *APOGEE-centric Ananke Simulations in a SciServer SQL Database*
   Rachael L. Beaton et al.
   Research Notes of the AAS, Volume 6, Issue 6, id.125.
6. *Optimal Transport Reconstruction of Baryon Acoustic Oscillations*
   Farnik Nikakhtar, Ravi K. Sheth, Bruno Lévy, Roya Mohayaee
   Submitted to Physical Review Letters.
7. *Precision Tests of CO and [CII] Power Spectra Models against Simulated Intensity Maps*
   Azadeh Moradinezhad Dizgah, **Farnik Nikakhtar**, Garrett K. Keating, Emanuele Castorina
   JCAP, Volume 2022, Issue 02, 31 pp.
8. *The smearing scale in Laguerre reconstructions of the correlation function*
   Farnik Nikakhtar, Ravi K. Sheth, Idit Zehavi
   Physical Review D, Volume 105, Issue 4
9. *New families in our Solar neighborhood: applying Gaussian Mixture models for objective classification of structures in the Milky Way and in simulations*
   Farnik Nikakhtar, Robyn E. Sanderson, et al.
   ApJ, Volume 921, Issue 2, id.106, 17 pp.
10. *Laguerre reconstruction of the BAO feature in halo-based mock galaxy catalogues*
    Farnik Nikakhtar, Ravi K. Sheth, Idit Zehavi
    Physical Review D 104 (6), 063504 (2021)
11. *Laguerre reconstruction of the correlation function on Baryon Acoustic Oscillation scales*
    Farnik Nikakhtar, Ravi K. Sheth, Idit Zehavi
    Physical Review D 104 (4), 043530 (2021)
12. *Galaxy properties as revealed by MaNGA. III. Kinematic profiles and stellar population gradients in S0s*
    H. Domínguez Sánchez, M. Bernardi, **Farnik Nikakhtar**, B. Margalef-Bentabol, R. K.Sheth
    MNRAS 495 (3), 2894–2908 (2020)
13. *The stellar mass Fundamental Plane: the virial relation and a very thin plane for slow rotators*
    M. Bernardi, H. Domínguez Sánchez, B. Margalef-Bentabol, **Farnik Nikakhtar**, R.K. Sheth
    MNRAS 494 (4), 5148-5160 (2020)

14. *Exact enumeration approach to first-passage time distribution of non-Markov random walks*
S. Baghram, **Farnik Nikakhtar**, M.R.R. Tabar, S. Rahvar, R.K. Sheth, K.Lehnertz, M. Sahimi
Physical Review E 99 (6), 062101 (2019)

15. *The Excursion set approach: Stratonovich approximation and Cholesky decomposition*
Farnik Nikakhtar, M. Ayromlou, S. Baghram, S. Rahvar, M.R.R. Tabar, R.K. Sheth
MNRAS 478, 5296–5300 (2018)

16. *Matrix Formalism of Excursion Set Theory: A new approach to statistics of Dark Matter halo counting*
Farnik Nikakhtar & Shant Baghram
Physical Review D 96, 043524 (2017)

Data Release Papers

1. *Public data release of the FIRE-2 cosmological zoom-in simulations of galaxy formation*
Wetzel et al.
Submitted to The Astrophysical Journal Supplement.

2. *The 17th Data Release of the Sloan Digital Sky Surveys: Complete Release of MaNGA, MaStar, and APOGEE-2*
Abdurro'uf et al.
The Astrophysical Journal Supplement Series, Volume 259, Issue 2, id.35, 39 pp.

Conference Proceedings

1. *Probing the Galactic Potential Using Optimal Transport Theory*
Farnik Nikakhtar, Quentin Mgot, Jason Hunt, Robyn Sanderson, Ravi K. Sheth, Roya Mohayaee, Bruno Levy; AAS Division on Dynamical Astronomy meeting # 53 (2022), id. 405.01.

2. *New families in our solar neighborhood*
Farnik Nikakhtar, Robyn E. Sanderson
American Astronomical Society Meeting meeting 236 (2020), 332.03.

3. *Reducing X-ray Bright Galaxy Groups Images with Theli Pipeline*
Farnik Nikakhtar
Publication of Korean Astronomical Society 30 (2015): 671-673.

Academic References

Nikhil Padmanabhan
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