Mehdi Rezaie (CV)

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Research Interests

Bioinformatics • Epidemiology • Deep Learning • High-Performance Computing • Cosmology

Academic Employment and Titles

Ohio University Graduate Research Assistant 2016-present
Ohio University Graduate Teaching Assistant 2015-2016
Sharif University of Technology Graduate Assistant 2012-2015
Asia Pacific Center for Theoretical Physics Research Assistant 2014-2015
Institute for Research in Fundamental Sciences Graduate Research Assistant 2013-2015

Education

Ph.D. candidate in Physics, Ohio University (OU), Athens, Ohio, USA Sep 2015 - present
Current GPA: **3.8/4**, *Supervisor:* Prof. Hee-Jong Seo,
Ph.D. expected: August 2020

M.Sc. in Physics, Sharif University of Technology (SUT), Tehran, Iran Sep 2012 - Jun 2015
GPA: **18.46/20**, *Supervisors:* Prof. Mehdi Golshani (SUT), Prof. Yasaman Farzan (IPM[1])

Visiting Student, POSTECH[2], Pohang, South Korea Sep 2014 - Mar 2015
Supervisor: Prof. Arman Shafieloo (KASI)

B.Sc. in Physics, Shahid Chamran University (SCU), Ahvaz, Iran Sep 2008 - Jun 2012
GPA: **18.51/20**, Magna cum laude, *Supervisor:* Dr. Mohammad Sabaian (SCU)

Skills

- *Programming*: Python, Jupyter Notebook, Git, BASH, Julia, FORTRAN, C
- *Machine Learning*: Neural Nets, Regression, Clustering, Dimensionality Reduction, Ensemble Methods
- *Software*: LaTeX, Gnuplot, MS Office, Tableau
- *Operating Systems*: Mac OS X, Linux, MS Windows

Collaboration Membership

· **SDSS-IV Extended Baryon Oscillation Spectroscopic Survey (eBOSS)**

Galaxy Quasar Clustering working group (2017-present): I have worked on the identification and mitigation of imaging systematics; helped with the quality assurance and tests of the systematics of the clustering catalogs of emission line galaxies (ELG) and quasars. I have also provided a survey selection function to simulate imaging systematics in the mock ELG catalogs. Recently, my primary contribution concentrates on the mitigation of systematic error for the DR16 quasar sample and the primordial non-Gaussianity measurement.

[1] Institute for Research in Fundamental Sciences, http://ipm.ac.ir/

[2] Pohang University of Science and Technology, http://postech.ac.kr/eng/

· **Dark Energy Spectroscopic Instrument (DESI)**

Galaxy Quasar Clustering and Imaging Validation working groups (2016-present): I have contributed to the analysis centering around the characterization and mitigation of foreground contaminations in the photometric catalogs of emission line galaxies and luminous red galaxies from the DESI Legacy Surveys data. I have helped with observing for a total of 17 nights at the Kitt Peak National Observatory, Arizona. I have also been involved in the clustering analysis of mock data (e.g., *quicksurvey* in 2017). My recent contribution focuses on the impact of imaging systematics on the measurements of baryon acoustic oscillations (BAO) and redshift-space distortions (RSD) with mock data.

Honors and awards

Travel Scholarship from the Rocky Mountain Advanced Computing Consortium, Boulder, CO	2019
Graduate Student of the Week, Ohio University Graduate Student Senate, Ohio University	2018
Travel Grant from Ohio University Graduate Student Senate for the DESI meeting at LBNL, CA	2017
Travel-support award for the Blind Data Analysis Workshop, Stanford, CA	2017
Ranked among top 5% in my masters class, Sharif University of Technology	2015
Six-month Research Assistantship at the Asia Pacific Center for Theoretical Physics, South Korea	2014
Scored full-mark in *GRE Physics* **(990/990), 94 (% below)**	2014
Ranked **third** among +8000 test-takers in the **nationwide qualifying exam** for M.Sc. in Physics	2012
Selected as distinguished undergraduate physics student for three consecutive years, SCU	2009-2012
Dean's list as top physics student, SCU	2009-2012
Ranked 1st in my undergraduate class (year), SCU	2012

Talks

"*Observational Systematics in the era of Big Astronomical Data*", mini-symposium on Scientific Computation, Stocker Engineering and Technology Center, Ohio University, February 5, 2020

"*Robust Measurements of the eBOSS and DESI Galaxy and Quasar Clustering*", 235th AAS, Honolulu, HI, Jan 4-8, 2020

"*Application of Deep Learning in Cosmology*", Department of Physics, Sharif University of Technology, Tehran, Iran, June 16, 2019

"*Emission Line Galaxies photometric weights with neural networks*", eBOSS collaboration meeting, Paris France, Dec 10-14, 2018

"*Deep learning systematics mitigation method*", DESI spring collaboration meeting, Tucson AZ, May 22-25, 2018

"*Mitigation of photometric systematics in galaxy clustering*", DECam community science workshop, Tucson AZ, May 21-22, 2018

"*Mitigating systematic errors in galaxy surveys with artificial intelligence*", the Center of Cosmology and Astro Particle Physics, Ohio State University, Columbus OH, Mar 12-16, 2018

"*Identification and Mitigation of the systematics effects on galaxy clustering using Neural Networks*", DESI science workshop, SLAC Stanford CA, Dec 4-7, 2017

"*DECaLS systematics tests and data challenge mock test*", DESI collaboration meeting LBNL Berkeley, CA, Jun 19-23, 2017

"*Clustering results from quicksurvey2017*", DESI collaboration meeting, LBNL Berkeley, CA, Jun 19-23, 2017

"*DECaLS systematics on target densities*", DESI collaboration workshop, Ohio State University, Columbus OH, Dec 7-9 2016

Poster Presentations

"*Probing Dark Energy with Galaxy Clustering and Deep Learning*", Poster presentation at Rocky Mountain Advanced Computing Consortium, Boulder, Colorado, May 21-23, 2019

"*Probing Dark Energy with Galaxy Clustering and Deep Learning*", Poster presentation at Inspiring Curiosity — Student Expo, Ohio University, OH April 11, 2019

Teaching Experience

Science & Math tutor for Upward Bound program, Ohio Univ. 2015-2017
Helped high school students from Athens county with preparation for the SAT, Geometry, Math, Statistics exams.

TA for Physics 2001, Undergraduate course, Ohio Univ. 2015-2017
Taught Physics 2001 lab and helped with the recitation class for Physics 2001

TA for General Physics, Undergraduate course, Sharif Univ. 2013-2014
Organized and planned weekly homework assignments and midterm exams.

Teacher of High School Physics, *Soroush* High School, Tehran, Iran 2013-2014
Taught high school students problem-solving strategies on topics ranging from kinematics to thermodynamics.

TA for Classical Electrodynamics, Graduate course, Sharif Univ. 2013-2014
Organized and planned the weekly homework assignments and recitation class.

TA for General Physics Lab, Undergraduate course, Sharif Univ. 2012-2013
Taught the general physics lab for science & engineering major undergraduate students.

Community Involvement / Volunteer Work

- *Physics Open House*: demo of telescopes, Ohio University, OH — Nov 9, 2019
- *Math and Science Family Night*: demo of IR cameras, Coolville, OH — Oct 3, 2019
- *Family Science Saturday*: demo of electric currents, Ohio University, OH — Apr 7, 2018
- *Math and Science Family Night*: demo of electric charges, Coolville, OH — Mar 8, 2018
- *Science Night*: demo of angular momentum, Nelsonville, OH — Mar 1, 2018
- *Physics Open House*: demo of hovercraft, Ohio University, OH — Nov 4, 2017
- *State Science Day*: judging, Columbus, OH — May 14, 2016
- *District Science Day*: demo of conductivity, Ohio University, OH — Mar 12, 2016
- *Kids On Campus*: demo of conductivity, Trimble Middle School, OH — Jan 13, 2016

References

Hee-Jong Seo (Ph.D. dissertation advisor)
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John Grimwade
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Publications

First author papers

1. Rezaie, Mehdi, Hee-Jong Seo, Ashley J. Ross, and Razvan C. Bunescu. "*Improving galaxy clustering measurements with deep learning: analysis of the DECaLS DR7 data*" Monthly Notices of the Royal Astronomical Society, Volume 495, Issue 2, June 2020, Pages 1613-1640, https://doi.org/10.1093/mnras/staa1231.
2. Rezaie, Mehdi, et al. "*Toward an accurate measurement of the primordial non-Gaussianity parameter with the SDSS-IV eBOSS DR16 Quasars from* $0.8 < z < 3.5$*: analysis of observational systematics*", in preparation.

Second author papers

3. Merz, Grant, **Mehdi Rezaie**, et al. "*Testing the Effect of Systematic Error Mitigation Methods on the BAO signal in the eBOSS DR16 Catalogs*" in preparation.
4. Zarrouk, Pauline, **Mehdi Rezaie**, et al. "*Baryon Acoustic Oscillations in the projected cross-correlation function between the eBOSS DR16 Quasars and photometric galaxies from the DESI Legacy Imaging Surveys*" in preparation.

Collaboration papers

5. Mueller, Eva, et al. (incl. **Mehdi Rezaie**) "*The Completed SDSS-IV extended Baryon Oscillation Spectroscopic Survey: Primordial non-Gaussianity in Fourier Space*" in preparation
6. Gil-Marin, Hector, et al. (incl. **Mehdi Rezaie**) "*The Completed SDSS-IV extended Baryon Oscillation Spectroscopic Survey luminous red galaxy sample: measurement of the BAO and growth rate of structure from the anisotropic power spectrum between redshift 0.6 and 1.0*" arXiv:2007.08994 (submitted)
7. Raichoor, Anand, et al. (incl. **Mehdi Rezaie**) "*The completed SDSS-IV extended Baryon Oscillation Spectroscopic Survey Emission Line Galaxy Sample: Large-scale Structure Catalogues and Measurement of the isotropic BAO between redshift 0.6 and 1.1*" arXiv:2007.09007 (submitted)
8. De Mattia, Arnaud, et al. (incl. **Mehdi Rezaie**) "*The Completed SDSS-IV extended Baryon Oscillation Spectroscopic Survey emission line galaxy sample: measurement of the BAO and growth rate of structure from the anisotropic power spectrum between redshift 0.6 and 1.1*" arXiv:2007.09008 (submitted)
9. Ross, Ashley, et al. (incl. **Mehdi Rezaie**) "*Large-scale Structure Catalogs for Cosmological Analysis of the completed extended Baryon Oscillation Spectroscopic Survey*" arXiv:2007.09000 (submitted)
10. Ahumada, Romina, et al. (incl. **Mehdi Rezaie**) "*The Sixteenth Data Release of the Sloan Digital Sky Surveys: First Release from the APOGEE-2 Southern Survey and Full Release of eBOSS Spectra.*" The Astrophysical Journal Supplement Series 249.1 (2020): 3
11. Dey, Arjun, et al. (incl. **Mehdi Rezaie**) "*Overview of the DESI Legacy Imaging Surveys*" The Astronomical Journal 157.5 (2019): 168
12. Khaledi-Nasab, Ali, M. Sabaeian, **M. Rezaie**, and M. Mohammad-Rezaee. "*Linear and nonlinear tunable optical properties of intersubband transitions in GaN/AlN quantum dots in presence and absence of wetting layer.*" Journal of the European Optical Society-Rapid publications 9 (2014).

Collaboration White papers

13. Aghamousa, Amir, et al. (incl. **Mehdi Rezaie**) "*The DESI Experiment Part I: Science, Targeting, and Survey Design*" arXiv:1611.00036 (2016)

14. Aghamousa, Amir, et al. (incl. **Mehdi Rezaie**) "*The DESI Experiment Part II: Instrument Design*" arXiv:1611.00037 (2016)