Kiyan Tavangar

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Education

Provost Scholar at the University of Chicago, Chicago, IL **Graduated: 06/21**

Majors: Astrophysics (Honors, Cum Laude), Mathematics

Relevant Classes: Computational Techniques in Astrophysics, Observational Techniques in Astrophysics, Gravitational Lensing, Spacetime and Black Holes, Cosmological Physics

GPA: 3.74
Primary Major (Astrophysics) GPA: 3.85

Research Interests:

Dark matter, near-field cosmology, stellar streams, galactic dynamics, Milky Way astrophysics, gravitational lensing, dark energy, stellar populations

Research Experience

Guest Researcher at the Flatiron Institute CCA **September 2021 – present**

Member of the CCA Dynamics Group. Working primarily with Dr. Adrian Price-Whelan on stellar streams in the Gaia EDR3 data, with a special focus on GD-1. Developing tools for obtaining a purer selection of stream stars including novel techniques for isochrone and proper motion selections. This will lead to cleaner selections of any objects that are collections of stars living along an isochrone (dwarf galaxies, globular clusters, streams, etc).

Research with Prof. Alex Drlica-Wagner at the University of Chicago **January 2019 - present**

Searching for previously undetected ultra-faint dwarf galaxies and stellar streams in new data of sky surveys being released. Modified code to facilitate the searches specifically in the Dark Energy Spectroscopic Instrument Legacy Surveys. Conducted an extensive analysis of the Phoenix stream by creating a statistical model to determine the track, width, and intensity along the stream, finding unexpected small scale density deviations.

Research with Prof. Michael Gladders at the University of Chicago **January 2020 - present**

Research with ChicagO Optically selected strong Lenses – Located At the Margins of Public Surveys collaboration (COOL-LAMPS), focused on the detection of new strong gravitational lenses. Created source models for the selected targets using Galfit. Converted raw data from the Nordic Optical Telescope into usable spectra. Helped publish an analysis on the brightest redshift 5 galaxy in the universe to date.

Summer Intern at Argonne National Laboratory **Summer 2018**

Ten week internship assisting Dr. Haidan Wen on X-ray spectroscopy and photoluminescence imaging of layered 2D materials. Developed extensive code to graph data to aid in comparisons between collected images**.**

Publications

Tavangar et al 2021. *From the Fire: A Deeper Look at the Phoenix Stream.*
Accepted to *The Astrophysical Journal*. https://arxiv.org/abs/2110.03703

- Input: Led analysis and writing. Presented a non-parametric morphological model, distance gradient model, and orbit model of the Phoenix Stream.

Tavangar and Price-Whelan (in prep). *Streams, Spurs, and Possible Progenitors: Modeling GD-1 in Gaia EDR3.*

- Input: Leading analysis and writing. Creating new membership probability model and orbit model for the GD-1 stream.

Li et al 2021. *S^5 : The Orbital and Chemical Properties of One Dozen Stellar Streams.*

Submitted to *The Astrophysical Journal*. https://arxiv.org/abs/2110.06950

- Input: Contributed to S^5 target selection and determining the stream features of some analyzed streams.

Ferguson et al 2021. *DELVE-ing into the Jet: a thin stellar stream on a retrograde orbit at 30 kpc.*
Submitted to AAS Journals. https://arxiv.org/abs/2104.11755

- Input: Helped create the morphological model for Jet used in this paper.

Stringer et al. (2021). Identifying RR Lyrae Variable Stars in Six Years of the Dark Energy Survey. *The Astrophysical Journal, Volume 911*(2), 109. https://arxiv.org/abs/2011.13930

- Input: Searched for main sequence stellar populations associated with RRL clumps.

Drlica-Wagner et al. (2021). The DECam Local Volume Exploration Survey: Overview and First Data Release. *The Astrophysical Journal Supplement Series, Volume 256*(1), 2. https://arxiv.org/abs/2103.07476

- Input: DELVE Collaboration member. Observing for the data release.

Khullar et al. (2020). COOL-LAMPS I. An Extraordinarily Bright Lensed Galaxy at Redshift 5.04. *The Astrophysical Journal, Volume 906*(2), 107. https://arxiv.org/abs/2011.06601

- Input: Searched for lens candidates in DECaLS data. Source modeling and writing of the paper

Shipp, Price-Whelan, **Tavangar**, Mateu, Drlica-Wagner. (2020). Discovery of Extended Tidal Tails Around the Globular Cluster Palomar 13. *The Astronomical Journal, Volume 160*(5), 244. https://arxiv.org/abs/2006.12501

- Input: Quantitatively verified stream significance to support discovery. Created spatial map showing new discovery (Fig. 1)

Mau, Cerny et al. (2020). Two Ultra-Faint Milky Way Stellar Systems Discovered in Early Data from the DECam Local Volume Exploration Survey. *The Astrophysical Journal, 890*(2), 136. https://arxiv.org/abs/1912.03301

- Input: Observing for the dataset. Worked on the satellite search tools used.

Presentations

Modeling GD-1 and the Spur in Gaia EDR3
Kavli Institute of Cosmological Physics Survey Science Group Meeting, February 2022

- Presenting improved constraints on GD-1 members using proper motion modeling and results from simulating the cause of the spur

Streams, Spurs, and Possible Progenitors: Modeling GD-1 in Gaia EDR3
AAS 239 Winter Meeting, January 2022

- Presenting improved constraints on GD-1 members using proper motion modeling and results from simulating the cause of the spur

Stream Modeling of ATLAS and Phoenix in DES
Streams 21: Constraints on Dark Matter, February 2021

- Presenting a new morphological model for both the Phoenix and ATLAS streams in DES Year 6 data

From the Fire: A Deeper Look at the Phoenix Stream
Southern Stellar Stream Spectroscopic Survey (S5) Telecon, November 2020

- Presenting a new morphological model for the Phoenix stream in DES Year 6 data

DES Year 6 and DECaLS Stream Analyses
DES Milky Way Working Group General Telecon, September 2020

- Presenting on the discovery of the a new stellar stream associated with globular cluster Palomar 13 and a deeper characterization of the Phoenix stream in DES Year 6 data

DES and DECaLS Year 6 Stream Analyses.
Kavli Institute of Cosmological Physics Survey Science Group Meeting, September 2020

- Presenting on the discovery of the a new stellar stream associated with globular cluster Palomar 13 and a deeper characterization of the Phoenix stream in DES Year 6 data

Dwarf Galaxy and Stellar Stream Detection in DECaLS DR7
Kavli Institute of Cosmological Physics Survey Science Group Meeting, January 2020

- Presenting on the search for new ultrafaint satellite dwarf galaxies in the DECaLS DR7 and DR8 surveys. Also presented upcoming potential discovery of stellar stream associated with Palomar 13

Scientific Collaborations

Center for Computational Astrophysics (CCA) Dynamics Group at the Flatiron Institute 2021 - present

ChicagO Optically selected strong Lenses – Located At the Margins of Public Surveys Collaboration (COOL-LAMPS) Member 2020 – present

Southern Stellar Stream Spectroscopic Survey (S^5) Member 2020 – present

Dark Energy Survey (DES) Collaboration Student Member 2019 – present

DECam Local Volume Exploration Survey (DELVE) Student Member 2019 – present

Kavli Institute of Cosmological Physics Survey Science Group Member 2019 – 2021

Technical Proficiencies

- Extensive knowledge of Python
- Working knowledge of MATLAB
- Working knowledge of Stan
- Basic knowledge of certain sublanguages of Scheme
- Experience in lensed source modeling
- Experience in stellar stream modeling
- Experience in orbit modeling
- Three nights remote observing experience with the Blanco 4m Telescope for the DELVE survey

Other

University of Chicago Varsity Cross Country and Track & Field Teams 2017 – present

- NCAA Division III All-Academic Men's Track & Field Team 2020
- University Athletic Association (UAA) All-Academic Recognition 2017, 2018, 2019, 2020, 2021
- Scoring member at conference championship 2018, 2019

Private Violinist (Since age 5)

Fluent in French, Dual US and French citizen

Intermediate level in Spanish