

# Harshil Kamdar

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## EDUCATION

### Harvard University

Cambridge, MA

Ph.D. Astronomy and Astrophysics

2016-Present

M.S. Computational Science & Engineering

2021

**Adviser:** Professor Charlie Conroy

### University of Illinois at Urbana-Champaign

Urbana, IL

B.S. Physics, Astronomy

2016

**Advisers:** Professor Robert Brunner, Professor Matthew Turk

## RESEARCH INTERESTS

Galaxy formation and evolution, star formation, disequilibrium in the Milky Way, galactic dynamics, star cluster formation & evolution, machine learning

## AWARDS & HONORS

Department of Energy Computational Science Graduate Fellow (\$200k+ award) 2016-2020

Placed 3rd (out of 100+ participants) in Kaggle competition about water level & meteorological forecasting for an Italian utilities company using geospatial remote sensing data (\$5k award) 2021

Placed 4th (out of 500+ participants) in Kaggle competition about the 2020 Kaggle Data Science Survey (\$4k award) 2021

Robert E. Hetrick Senior Thesis Prize 2016

Stanley J. Wyatt Memorial Award 2016

NSF Blue Waters Computational Internship 2015-2016

Harry E. Preble Award for Undergraduate Research (\$1k award) 2015

## PUBLICATIONS

**9 total; 6 as first author; ~110 citations**

**Kamdar, H.M.**, Conroy, C., Ting, Y.S., et al., 2021, *submitted to ApJ*. [[arXiv:2106.02050](https://arxiv.org/abs/2106.02050)]

*Stellar Streams in the Galactic Disk: Predicted Lifetimes and Their Utility in Measuring the Galactic Potential*

Speagle, J., Zucker, C., Cargile, P., et al., 2021, *submitted to ApJ*.

*Deriving Stellar Properties, Distances, and Reddenings using Photometry and Astrometry with BRUTUS*

Speagle, J., Zucker, C., Cargile, P., et al., 2021, *submitted to ApJ*.

*Mapping the Milky Way in 5-D with 170 Million Stars*

Nelson, T. Ting, Y.S., Hawkins, K., et al., 2021 *submitted to ApJ*. [[arXiv:2104.12883](https://arxiv.org/abs/2104.12883)]

*Distant Relatives: The Chemical Homogeneity of Comoving Pairs Identified in Gaia*

**Kamdar, H.M.**, Conroy, C., Ting, Y.S., et al., 2020, *in press*. [[arXiv:2007.10990](https://arxiv.org/abs/2007.10990)]

*Spatial and Kinematic Clustering of Stars in the Galactic Disk*

**Kamdar, H.M.**, Conroy, C., Ting, Y.S., et al. 2019, *ApJL*, 884(2), L42. [[arXiv:1904.02159](https://arxiv.org/abs/1904.02159)]

*Stars that Move Together Were Born Together*

**Kamdar, H.M.**, Conroy, C., Ting, Y.S., et al. 2019, *ApJ*, 884 (2), 173. [[arXiv:1902.10719](https://arxiv.org/abs/1902.10719)]

*A Dynamical Model for Clustered Star Formation in the Milky Way Disk*

**Kamdar, H.M.**, Turk, M.J., and Brunner, R.J. 2016, *Monthly Notices of the Royal Astronomical Society*, 457, 1162  
[arXiv:1510.07659]

*Machine Learning and Cosmological Simulations II: Hydrodynamical Simulations*

**Kamdar, H.M.**, Turk, M.J., and Brunner, R.J. 2016, *Monthly Notices of the Royal Astronomical Society*, 455, 642  
[arXiv:1510.06402]

*Machine Learning and Cosmological Simulations I: Semi-Analytical Models*

## **OBSERVING & COMPUTING PROGRAMS**

Co-I for 2M CPU hour grant on Gadi supercomputer	2021
Co-I for 3 nights on MIKE to study wide binaries & co-moving pairs discovered in <i>Gaia</i> DR2	2019
PI for 25k node hours (~0.5 million CPU hours) on Blue Waters supercomputer	2016

## **PRESENTATIONS (<sup>†</sup> = INVITED)**

### **Talks**

<sup>†</sup> Tufts University Astronomy Seminar	Oct 2021
<sup>†</sup> Milky Way Meeting – The Max Planck Institute for Astronomy	June 2021
Machine Learning Journal Club	April 2021
Carnegie Observatories	Dec 2020
MIT: Computational Research in Boston and Beyond	Dec 2020
Linking the Galactic and Extragalactic: Stellar dynamics and stellar populations of the Milky Way and its siblings	Dec 2020
<sup>†</sup> The Ohio State University: CCAPP Seminar	Nov 2020
Galread – Princeton University	Oct 2020
<sup>†</sup> Milky Way Meeting – The Max Planck Institute for Astronomy	July 2020
<sup>†</sup> Department of Energy Computational Science Graduate Fellowship Program Review – Arlington, VA	July 2020
<sup>†</sup> Institute for Theory & Computation Luncheon Talk – Cambridge, MA	Oct 2019
International Astronomical Union Symposium 353 – Shanghai, China	June 2019
53rd ESLAB Gaia Symposium – Noordwijk, Netherlands	April 2019
KITP Program: Dynamical Models for Stars and Gas in Galaxies in the Gaia Era – Santa Barbara, CA	Mar 2019
Life and Times of the Milky Way – Shanghai, China	Nov 2018
Machine Learning Journal Club, Harvard University – Cambridge, MA	March 2018, April 2018
Eisenstein Group Meeting, Harvard University – Cambridge, MA	Dec 2017
<sup>†</sup> Astrophysics, Cosmology, and Gravitation Seminar – Urbana, IL	Feb 2016
Dept of Physics Undergraduate Research Symposium – Urbana, IL	Jan 2016
DES Chicagoland Meeting – Urbana, IL	Dec 2015

### **Posters**

The Local Group: Assembly & Evolution	Sep 2020
DOE CSGF Program Review	July 2017, 2018, 2019
227th American Astronomical Society Meeting	Jan 2016
Undergraduate Research Symposium	Apr 2015, 2016
Annual Computational Science & Engineering Meeting – National Center for Supercomputing Applications	Apr 2014

## **TEACHING & MENTORING EXPERIENCE**

### **Resident Tutor, Mather House**

Cambridge, MA

Fellowships Tutor, Hiring Tutor, Intramurals Tutor August 2017 – present

- Provide academic mentoring, residential support, and build community for students in an undergraduate house at

Harvard College

- Support and edit students' applications for the Rhodes, Marshall, Churchill, and other fellowships
- Co-lead a hiring team of 10+ tutors to read 400+ applications every year to recruit 2-10 new tutors every year.

**Harvard University**

Cambridge, MA

- Teaching Fellow: Prediction: The Past and Present of the Future (Gen Ed 1112)

2020

**NSF Latino Initiative Program, Smithsonian Astrophysical Observatory**

Cambridge, MA

- Mentored college student from the Boston area and help them with their research project
- Advised student on graduate application process and edit application materials

**University of Illinois at Urbana-Champaign**

Urbana, IL

- Grader: Extraterrestrial Life (Astronomy 330)

2015

**LEADERSHIP EXPERIENCE & PROFESSIONAL SERVICE**

**Communicating Science Conference (ComSciCon; <https://comscicon.com>)**

Cambridge, MA

Leadership Team Chair

August 2020 – present

Renewals Chair

June 2019 – July 2020

Logistics Organizing Committee Chair

May 2018 – July 2020

- Organized 3 national conferences to date on written and oral communication skills for graduate students in all fields of science & engineering
- Chair and coordinate volunteer Leadership Team of more than 15 people
- Led fundraising and management of nearly \$300,000 budget to date from more than 10 university and professional society partners
- Past chair of 12-graduate student organizing committee; inviting expert speakers, advertising workshops, and reviewing 1,000+ applications from across the country per event

**GSAS Graduate Student Council**

Cambridge, MA

Representative

2016 – 2020

- Represent the Graduate School of Arts & Sciences at the Harvard-wide Graduate Student Council
- Drafted resolutions and released statements on issues affecting graduate students across the university

**Science by the Pint**

Cambridge, MA

Organizer and Moderator

2016 – 2018

- Organized events at local pubs where STEM professors present their research in an informal setting

Journal Referee (MNRAS)

2017-present

**TECHNICAL SKILLS**

*Programming and Computation:* Python, PyTorch, PyMC3, Altair, Plotly, GeoPandas, CUDA, Tensorflow, AWS, C, OpenMP/MPI, Matplotlib, NumPy, SciPy, JAX, Pandas, Scikit-Learn, D3.js, Git, R, rasterio

*Machine Learning and Statistics:* Clustering, Bayesian inference, neural networks and deep learning, Markov chain Monte Carlo (MCMC), normalizing flows

**PERSONAL**

**Citizenship:** USA

**Languages:** English, Gujarati, Hindi