Jacob Nibauer

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ORCID: 0000-0001-8042-5794 | Publications: NASA ADS

Education

Princeton University — Princeton, NJ
M.A., Ph.D. Astrophysics (intended) — *Sep. 2021 onwards*

University of Pennsylvania — Philadelphia, PA
B.A. Physics & Astronomy with Honors | *Summa cum laude* — *Aug. 2017 - May 2021*

- ⋆ Senior Honors Thesis: *Mixture Models and Astrophysical Data: From Planetary Systems to Stellar Populations*

Honors & Awards

Phi Beta Kappa, University of Pennsylvania	2022
Chambliss Astronomy Achievement Award, AAS	2021
Rose Research Award, UPenn	2021
Martin Schwarzschild Graduate Fellowship, Princeton University	2021
University of Pennsylvania CURF Grant Recipient	2020
LSST Corporation Grant Recipient	2019
Math Department Good Teaching Award, UPenn	2018, 2019, 2020
Dean's List, UPenn	All years offered (covid)
UPenn Undergraduate Research Fellowship Recipient	2018

Publications

Lead Author

Charting Galactic Accelerations with Stellar Streams and Machine Learning, 2022, Submitted, arxiv:2205.11767 — **J. Nibauer**, V. Belokurov, M. Cramner, J. Goodman, S. Ho

Statistics of the Chemical Composition of Solar Analog Stars and Links to Planet Formation, 2021, ApJ, **907**, 116, doi:10.3847/1538-4357/abd0f1 — **J. Nibauer**, E. Baxter, B. Jain, J. van Saders, R. Beaton, J. Teske.

The Statistics of Extended Debris Disks Measured with Gaia and Planck, 2020, AJ, **159**, 210, doi:10.3847/1538-3881/ab8192 — **J. Nibauer**, E. Baxter, B. Jain.

Contributing Author

The Simons Observatory: Galactic Science Goals and Forecasts, 2022, ApJ, **929**, 166, doi:10.3847/1538-4357/ac5e36 — The Simons Observatory Collaboration

Presentations & Talks

Univ. of Cambridge Galactic Dynamics Group — May 2022

- *Talk.* Charting Galactic Accelerations with Stellar Streams

AAS 53rd Division of Dynamical Astronomy — April 2022

- *Talk.* Charting Galactic Accelerations with Stellar Streams

Center for Computational Astrophysics, Cosmology×Data-Science April 2022

- *Talk.* Model Independent Potential Reconstruction with Stellar Streams

Center for Computational Astrophysics, Lunch Talk April 2022

- *Talk.* Model Independent Potential Reconstruction with Stellar Streams

University of Montreal: Parsec Institute March 2022

- *Invited Talk.* Charting Galactic Accelerations with Stellar Streams

Brown University Machine Learning Seminar Feb 2022

- *Invited Talk.* ML for Galactic Dynamics: Constructing Flexible Models for the Milky Way Potential

239$^{\text{th}}$ AAS General Meeting, Utah (Cancelled due to Covid) Jan 2022

- *iPoster and Talk.* Deep Learning the Gravtiational Potential from a Snapshot of 5D Kinematic Phase Space

Pan-Experiment Galactic Science Group Nov 2021

- *Invited Talk.* Forecasting Thermal Emission from Exo-Oort Clouds with the Simons Observatory

238$^{\text{th}}$ AAS General Meeting, Virtual June 2021

- *iPoster and Talk.* Signatures of Planet Formation in the Chemical Composition of Solar Analogs? A New Statistical Approach
- *Panelist.* Exoplanet and Brown Dwarf Press Conference

Emerging Researchers in Exoplanet Science (ERES), Virtual May 2021

- *Talk.* Signatures of Planet Formation in the Chemical Composition of Solar Analogs? A New Statistical Approach

Penn Fall Virtual Research Expo Sep 2020

- *Poster.* Presented research characterizing refractory element depletion patterns across large samples of stars using data from APOGEE.

Exoplanets III, Virtual. July 2020

- *Poster.* Presented preliminary results characterizing refractory element depletion patterns across large samples of stars using data from APOGEE.

LSST Project & Community Workshop, Tuscon, AZ. Aug 2019

- *Poster & Talk.* Statistics of extended debris disks measured with *Gaia* and *Planck*. Main results presented among other selected undergraduates in plenary session.

University of Pennsylvania Data Science Seminar Aug 2019

- *Talk.* Taught a tutorial session on applications of neural networks to image processing in the context of unsupervised machine learning and scientific data analysis.

CURF Research Expo, University of Pennsylvania Sep 2018

- *Poster.* The search for Fast Evolving Luminous Transients (FELTs) in the Dark Energy Survey.

Observing Experience

- W. M. Keck Observatory, Keck 1 10 m Telescope (MOSFIRE) **1 Night**

Selected Press Coverage

Penn Today — June 2021

- "Connecting a star's chemical composition and planet formation"

Universe Today — June 2021

- "What's the Connection Between the Chemistry of a Star and the Formation of its Planets?"

Teaching Experience

Physics 359, Statistics & Machine Learning (TA) — Spring 2021

- Office hour sessions & grading of weekly problem sets. Course is intended to provide students pursuing research in physics with a strong background in statistical data analysis and machine learning applications.

Math 114E, Multivariable Calculus for Engineers (TA) — Fall 2018 - Spring 2020

- Taught weekly recitations for up to three sections, $\sim$ 100 students. Graded problem sets, exams, and held office hours.

Multivariable Calculus Teaching Resources — Fall 2018 - Spring 2020

- Created a set of lecture notes and recitation problems currently available at `https://www.math.upenn.edu/~ghrist/BLUE.html`. Resources used by students, TAs, and lecturers.

Skills & Experience

- **Programming:** Python, Bash, Git, Mathematica, LaTeX, Matlab
- **Research Topics:** Solar analogs, Stellar Composition, Galactic Dynamics, Galactic Archaeology, Debris disks, Oort clouds, CMB surveys, Transients, Astrostatistics, Bayesian Inference, Hierarchical Modeling, Mixture Model Classifications, Machine learning
- **Data Analysis and Inference:** `HEALPix`, `Pixell`, DS9, TOPCAT, MCMC, Hamiltonian Monte Carlo (HMC), scikit-learn, PyTorch, TensorFlow, standard scientific python libraries
- **Supercomputer Experience:** National Energy Research Scientific Computing Center (NERSC) — Edison, Cori

Service & Outreach

Moelis Access Science Physics Curriculum Chair — Sep 2018 - Sep 2019
Moelis Access Science Head TA — Sep 2018 - Sep 2019
UnEarthed Magazine, Writer — Fall 2018