

# Jacob Nibauer

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

## EDUCATION

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<b>Princeton University</b>	Princeton, NJ
M.A., Ph.D. Astrophysics (intended)	<i>Sep. 2021 onwards</i>
<b>University of Pennsylvania</b>	Philadelphia, PA
B.A. Physics & Astronomy with Honors   <i>Summa cum laude</i>	<i>Aug. 2017 - May 2021</i>
★ Senior Honors Thesis: <i>Mixture Models and Astrophysical Data: From Planetary Systems to Stellar Populations</i>	

## HONORS & AWARDS

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

## PUBLICATIONS

### Lead Author

*Charting Galactic Accelerations with Stellar Streams and Machine Learning*, 2022, Submitted, [arxiv:2205.11767](https://arxiv.org/abs/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.3847/1538-4357/ac5e36)

The Simons Observatory Collaboration

## PRESENTATIONS & TALKS

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UNIV. OF CAMBRIDGE GALACTIC DYNAMICS GROUP	May 2022
• <i>Talk</i> . Charting Galactic Accelerations with Stellar Streams	
AAS 53 <sup>rd</sup> DIVISION OF DYNAMICAL ASTRONOMY	April 2022
• <i>Talk</i> . 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<sup>th</sup> AAS GENERAL MEETING, UTAH (CANCELLED DUE TO COVID) Jan 2022
- *iPoster and Talk.* Deep Learning the Gravitational 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<sup>th</sup> 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

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

## SELECTED PRESS COVERAGE

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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

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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, ~ 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

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- **Programming:** Python, Bash, Git, Mathematica, L<sup>A</sup>T<sub>E</sub>X, 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

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MOELIS ACCESS SCIENCE PHYSICS CURRICULUM CHAIR

Sep 2018 - Sep 2019

MOELIS ACCESS SCIENCE HEAD TA

Sep 2018 - Sep 2019

UNEARTHED MAGAZINE, WRITER

Fall 2018