

Kevin McKinnon

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Citizenship: Canada

Education

2017–2023
(Expected)

University of California, Santa Cruz

- M.Sc. in Astronomy and Astrophysics (July 2019)
- Designated Emphasis in Statistics (June 2020)
- Anticipated Ph.D. in Astronomy and Astrophysics (Spring 2023)
- Advisors: Raja GuhaThakurta, Connie Rockosi

2013–2017

Queen's University, Kingston, ON

- B.Sc. (Honours) with Distinction in Physics
- Minor in Mathematics and Statistics
- Governor General's Academic Silver Medal, awarded to the undergraduate with the highest academic standing
- Advisor: Stéphane Courteau

Research Interests

The Milky Way, galaxy formation and evolution, stellar halos, chemical abundances, observational astronomy (stellar spectroscopy), applied statistics, and astronomical applications of machine learning.

Research Positions

2017–present

University of California, Santa Cruz

- Creating a hierarchical Bayesian pipeline that considers spectroscopic and photometric information to measure chemical abundances and distances of main sequence turn-off stars in the Milky Way's stellar halo with the HALO7D survey (Advisors: Raja GuhaThakurta, Connie Rockosi).
- Analysis of 7D chemodynamics of individual MW stellar halo stars in the near future (Advisors: Raja GuhaThakurta, Connie Rockosi).
- Characterizing structure in residuals of data-driven models of APOGEE stellar spectra to understand the MW ISM (Advisors: Melissa Ness, Raja GuhaThakurta, Connie Rockosi).
- Leading observations on the Shane Telescope for spectroscopic followup of luminous variables and transients for the SALVATION project (Advisors: Raja GuhaThakurta, Monika Soraisam). To date, 12 Astronomer's Telegram notices released.

2015–2017

Queen's University

- Assessing Next Generation Virgo Survey photometry and measuring diffuse light from stellar halos around Virgo Cluster galaxies (Advisor: Stéphane Courteau)

Selected Awards and Fellowships

2018	Osterbrock Leadership Associates Award (UC Santa Cruz)
2017	Osterbrock Mini-Grant (UC Santa Cruz)
2017	Regents' Fellowship (UC Santa Cruz)
2017	NR Tuition Fellowship (UC Santa Cruz)
2017	The Governor General's Academic Silver Medal awarded to the undergraduate with the highest academic standing in an honours bachelor's degree (Queen's)
2016	Undergraduate Student Research Award (Natural Sciences and Engineering Research Council of Canada)
2016	Carl Reinhardt Scholarship for high standing in the physics program (Queen's)
2016	The R.W. Leonard Penultimate Year Scholarship for having the highest academic standing in an honours B.Sc. program over the first three years (Queen's)
2014–2017	Dean's Honour List with Distinction (Queen's)
2014, 2015	The Arthur Loudon Scholarship in Physics (Queen's)

Publications

1. **K. McKinnon**, E. C. Cunningham, C. M. Rockosi, P. Guhathakurta, I. Escala, & E. N. Kirby, "HALO7D III: Chemical Properties of Milky Way Halo Stars from Medium Resolution Spectra," in prep.
2. N. Smyth, S. Profumo, S. English, T. Jeltema, **K. McKinnon**, & P. Guhathakurta, "Updated Constraints on Asteroid-Mass Primordial Black Holes as Dark Matter," Phys. Rev. D, 101, 063005 [[arXiv: 1910.01285](https://arxiv.org/abs/1910.01285)]
3. T. Takaro, R. J. Foley, C. McCully, W. Fong, S. W. Jha, G. Narayan, A. Rest, M. Stritzinger, & **K. McKinnon**, "Constraining Type Iax Supernova Progenitor Systems with Stellar Population Age-dating," MNRAS, 493, 986 [[arXiv: 1901.05461](https://arxiv.org/abs/1901.05461)]

Selected Non-Refereed Publications

1. **K. McKinnon**, S. Figueero, R. Nunez, P. Guhathakurta, M. Soraisam, C.H. Lee, "Spectroscopic classification of AT2020aced and AT2020abox," ATel #14281
2. M. Soraisam, **K. McKinnon**, R. Nunez, S. Figueero, P. Guhathakurta, C.H. Lee, T. Matheson, S. DeSantis "Spectroscopic classification of AT2020abkq and AT2020abcn," ATel #14257
3. M. Soraisam, **K. McKinnon**, R. Nunez, P. Guhathakurta, S. Figueero, C.H. Lee, S. DeSantis, T. Marquez, "Spectroscopic classification of transients from ZTF," ATel #14190
4. M. Soraisam, **K. McKinnon**, R. Nunez, P. Guhathakurta, S. Figueero, C.H. Lee, S. DeSantis, T. Marquez, "Spectroscopic classification of ZTF20acplkub as a nova in M31," ATel #14184
5. M. Soraisam, **K. McKinnon**, R. Nunez, P. Guhathakurta, S. Figueero, C.H. Lee, S. DeSantis, T. Marquez, K. El-Badry, "Spectroscopic classification of AT2020yky as a nova in M31," ATel #14150

Talks

- 2020 The Local Group: Assembly and Evolution, “Chemical Properties of the Milky Way’s Stellar Halo” | Space Telescope Science Institute, Baltimore, MD (Virtual Meeting)
- 2020 Visiting Science Talk at Keck Headquarters, “Chemical Properties of the Milky Way’s Stellar Halo” | Waimea, HI
- 2019 UC Santa Cruz FLASH Seminar, “Chemical Properties of the Milky Way’s Stellar Halo” | UCSC, Santa Cruz, CA
- 2018 Stellar Halos Across the Cosmos, “The Ubiquity of Stellar Halos in the Virgo Cluster” | MPIA, Heidelberg, Germany

Posters

- 2021 Statistical Challenges in Modern Astronomy VII, “Structure in Residuals of Data-Driven Models of APOGEE Stellar Spectra” | The Pennsylvania State University, University Park, PA (Virtual Meeting)
- 2019 Santa Cruz Galaxy Workshop, “Chemical Properties of the Milky Way’s Stellar Halo” | UCSC, Santa Cruz, CA
- 2018 The Physics of Scaling Relations and the Nature of Dark Matter, “The Ubiquity of Stellar Halos in the Virgo Cluster” | Queen’s University, Kingston, ON.
- 2017 Honours Thesis at Queen’s, “Assessment of NGVS Photometry and Diffuse Stellar Halos around Virgo Galaxies” | Queen’s University, Kingston, ON

Workshops/Schools/Conferences Attended

- 2018 Santa Cruz Galaxy Workshop | Santa Cruz, California
- 2016 Dunlap Institute Summer School | Toronto, Canada
- 2016 Dunlap Mauna Kea School | Big Island of Hawaii, Hawaii

Teaching

- 2021 Teaching Assistant • Astronomy 119, Introduction to Scientific Computing, UCSC
- 2019 Teaching Assistant • Astronomy 118, The Physics of Planetary Systems, UCSC
- 2018 Teaching Assistant • Astronomy 1, Introduction to the Cosmos, UCSC
- 2016 Independent Calculus and Physics Tutor • Queen’s University
- 2014, 2015 Math and Science tutor • Shawnigan Lake School, Shawnigan Lake, BC
- 2013–2016 Math and Physics Tutor • Arts & Science Undergraduate Society, Queen’s University

Telescope Use

- 2020 Kast Double Spectrograph, Shane Telescope, Lick Observatory | 11 Nights, 15 ToOs
- 2020 DEIMOS, Keck II Telescope, Keck Observatory | 2.75 Nights
- 2019 Kast Double Spectrograph, Shane Telescope, Lick Observatory | 4 Nights

Outreach

- 2021 Astronomy on Tap Public Talk • UCSC’s Astronomy on Tap, Santa Cruz, CA (Virtual Event)
- Gave talk titled “The Milky Way Structure Throughout History”, which summarizes our understanding of the MW structure throughout history to present day

- [Link to YouTube recording of talk is found here](#)
- 2021-present PyaR Volunteer • Santa Cruz, CA (Virtual Events)
- Free Python tutorial that covers the basics of Python computer programming via a series of Jupyter notebooks
 - The notebooks follow the data analysis of stellar disk kinematics of the Andromeda Galaxy using real data
 - Students from all over the world learn about scientific programming in Python while they write missing lines of code from the notebooks
- 2019-present Demographic Analyst • UCSC’s Astronomy on Tap, Santa Cruz, CA
- Transcribe paper responses to demographics questionnaire into analysable data and track audience-composition trends between events to quantify how effectively we are reaching a diverse audience within the local community
- 2017-present Volunteer (2017–present) and Grad Student Coordinator (2019–present) • La Noche de las Estrellas, Lick Observatory, Mount Hamilton, CA
- Help plan and execute this annual event at Lick Observatory event to reach out to the local Spanish-speaking communities and encourage student interest in the sciences
 - Leading up to the main event, visit local science classrooms and MESA clubs with astronomy activities
 - Address and dispel misconceptions about what types of people can become scientists
- 2017-present Volunteer • Telescope Outreach Nights, Santa Cruz, CA
- Bring telescopes to events for local middle schools, Girl Scout troops, and local science events (e.g. Santa Cruz Museum of Natural History)
 - Teach about the night sky and answer astronomy-related questions
- 2018, 2020 (June–August) Mentor • Science Internship Program, UCSC, Santa Cruz, CA
- Primary mentor for 6 high school students (3 each year)
 - Projects on (i) the effects of systematic errors from spectral redaction pipelines (e.g. poor wavelength solutions, slit mis-centering) and; (ii) characterizing properties of MW stellar halo stars with weak Paschen series absorption
 - Students presented findings at the AAS and Sigma Xi Student Research Conference
- 2017-present Mentor • UCSC’s Society of Physics Students and Women in Physics and Astronomy Mentoring Program, Santa Cruz, CA
- Mentor incoming first year and transfer students in the physics major
 - Meet weekly to give academic advice and provide general support
- 2018, 2019 Mentor • UCSC’s AY9 Project mentor
- Introduction to research for undergrads in physics and astronomy, with a focus on reaching students from underrepresented groups
 - Chose a research project, led a team of 4-5 students, taught research methods and programming

Professional Development

2017–2019

Osterbrock Leadership Program • UCSC, Santa Cruz, CA

- 1 year as PI of a mini-grant project in an effort to make UCSC's astronomy research more accessible to the public
- 1 year as an Osterbrock Fellow helping to improve the mini-grant application and follow-up processes
- Participated in the Osterbrock Communication Workshop to improve presentation skills

Technical Skills

Programming languages: Python, R, Bash, C

Statistical/Bayesian modelling

Processing and analysing complex datasets (e.g. low SNR spectra)

Keck II/DEIMOS mask design

Observing on Shane/KAST at Lick Observatory and on Keck II/DEIMOS

Using PyPeIt and spec2d to reduce spectral data