ERIC W. KOCH

POSTDOCTORAL FELLOW, SMITHSONIAN ASTROPHYSICAL OBSERVATORY

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ACHIEVEMENTS

- **Awarded $650,000 in grants ($275,000 as research fellowships)**
- **Authored 54 peer-reviewed publications with >2700 citations**
- **Mentored 15 students (1 PhD student)**
- **17 observing programs as PI (>500 h) and >40 as co-I (>3000 h) awarded through competitive review (ALMA, SMA, GBT, VLA, e-MERLIN, VLT, VLBA, HST, JWST, MeerKAT, NOEMA)**
- **Co-lead and developer of open-source packages for astronomy: radio-astro-tools, TurbuStat, FilFinder – widely used in >100 independent publications**
- **Processing and archiving for large astronomical data – Data Lead for the Local Group L-band Survey (lglbs.org)**

RESEARCH POSITIONS

Center for Astrophysics | Harvard & Smithsonian Oct 2020 - Present

- Submillimeter Array Postdoctoral Fellow
  - Independent postdoctoral researcher
  - Observatory support (observer; proposal preparation; analysis and calibration software)
- National Sciences and Engineering Research Council of Canada (NSERC) Postdoctoral Fellow
- Director, Seamless Astronomy
  - Institute for linking scientific data, publications, and communities
  - Lead community building across data science and software development groups at the Center for Astrophysics: seamlessastronomy.org

EDUCATION

University of Alberta | PhD in Physics 2016-2020

➢ Advisor: Erik Rosolowsky

➢ Thesis: Connecting galactic to local scales in the neutral interstellar medium across the Local Group

University of Alberta | MSc in Physics 2014-2016

➢ Advisor: Erik Rosolowsky

➢ Thesis: The Atomic Interstellar Medium in M33

University of British Columbia, Okanagan| Honours BSc in Physics 2010-2014

FUNDING & GRANTS AWARDED

Awarded 5 grants as PI/co-PI ($95,000) and 4 as co-I ($275,000).

As PI or co-PI:

Reproducible & Accessible Sub-mm Science Tutorials: Unlocking the vast SMA archive 2024
Smithsonian Scholarly Studies Program **$46,066**
- co-PI with G. Keating

Unmixing the ISM: Identifying Dominant Physical Effects with JWST/MIRI Mapping of M33
JWST Cycle 2 GO-3436 **$65,000** 2024

Spatio-spectral modeling of ALMA data cubes: Insights and Challenges for ALMA-2030
NAASC Workshop Funding **$24,000** 2024
- SOC Chair and lead organizer for a community workshop on open-source software for radio interferometry

Linking the Resolved Filamentary Molecular ISM to Massive Star Formation across M33
NRAO Student Observing Support **$20,670** 2023-2024
- Supported undergraduate researchers C. Carreira and S. Prasad for observations from 2022.1.00403.S

Molecular Gas in the Milky Way analog NGC 891 2021
Smithsonian Scholarly Studies Program **$27,932**
- co-PI with D. Wilner

As co-I:

An Operational Cloud-based Prototype of the CfA Nexus: Implementation of Multi-wavelength Use Cases
SI Innovation Funds – PI: R. Martinez-Galarza **$64,905** 2023
- Supporting integration of SMA data and science use cases

The influence of superbubble feedback on molecular gas and star formation across galactic environments
Smithsonian Scholarly Studies Program – PI: C. Lada **$10,635** 2023
- (Partially) supported summer research for students A. Medina, T. Sonnenberg, and A. Angress

Linking CASA to the astropy ecosystem
ALMA Development Study - Cycle 7 – PI: A. Ginsburg **$199,905** 2021
- Co-lead of radio-astro-tools project
- Created pedagogical, online python tutorials for radio astronomy

SELECTED AWARDS

NSERC Postdoctoral Fellowship | Smithsonian Astrophysical Observatory 2022-2024
Submillimeter Array Postdoctoral Fellowship | Smithsonian Astrophysical Observatory 2020-
Alberta Graduate Excellence Scholarship | University of Alberta 2020
Andrew Stewart Memorial Graduate Prize | University of Alberta 2019
NSERC Alexander Graham Bell Canada Graduate Scholarship - Doctorate | University of Alberta 2017-2019
Queen Elizabeth II Graduate Scholarship - Masters | University of Alberta 2015
NSERC Alexander Graham Bell Canada Graduate Scholarship - Masters | University of Alberta 2014
Distinguished Graduate Award - Physics, Math, Statistics & Computer Science | UBC Okanagan 2014
Top Oral Presenter - UBC-O Undergraduate Research Conference | UBC Okanagan 2013
Upper Year Physics Award - Physics, Math, Statistics & Computer Science | UBC Okanagan 2014
Deputy Vice Chancellor Scholarship | UBC Okanagan 2010-2014
President's Entrance Scholarship | UBC Okanagan 2010

PUBLICATIONS

Authored 54 refereed publications with >2,500 citations. Full publication library is available on ADS.

- ➢ 8 lead author/equal lead contributor (>280 citations)
- ➢ 4 papers currently under review

Publications as Lead Author:

1. **Koch** et al. 2021. *MNRAS*, 504, 1801. A lack of constraints on the cold opaque H I mass: H I spectra in M31 and M33 prefer multicomponent models over a single cold opaque component
2. **Koch** et al. 2020. *MNRAS*, 492, 2663. Spatial power spectra of dust across the Local Group: No constraint on disc scale height
3. **Koch** et al. 2019. *AJ*, 158, 1. TURBUSTAT: Turbulence Statistics in Python
4. **Koch** et al. 2019. *MNRAS*, 485, 2324. Relationship between the line width of the atomic and molecular ISM in M33
5. **Koch** et al. 2018. *MNRAS*, 480, 3193. Kinematics of the atomic ISM in M33 on 80 pc scales
6. **Koch** et al. 2017. *MNRAS*, 471, 1506. Identifying tools for comparing simulations and observations of spectral-line data cubes
7. **Koch** & Rosolowsky 2015. *MNRAS*, 452, 1506. Filament identification through mathematical morphology
8. **Koch** et al. 2014. *MNRAS*, 442, 372. The 2013 outburst of a transient very faint X-ray binary, 23 arcsec from Sgr A*

Selected Co-authored Publications:

9. Peltonen et al. 2024. *MNRAS*, in press. JWST reveals star formation across a spiral arm in M33
10. Eibensteiner et al. 2023. *A&A*, 675, 37. Kinematic analysis of the super-extended H I disk of the nearby spiral galaxy M 83
11. Sandstrom, **Koch** et al. 2023. *ApJL*, 944, L8. PHANGS-JWST First Results: Tracing the Diffuse Interstellar Medium with JWST Imaging of Polycyclic Aromatic Hydrocarbon Emission in Nearby Galaxies. S
12. Meidt et al. 2023. *ApJL*, 944, L18. PHANGS-JWST First Results: Interstellar Medium Structure on the Turbulent Jeans Scale in Four Disk Galaxies Observed by JWST and the Atacama Large Millimeter/submillimeter Array
13. Lee et al. 2023. *ApJL*, 944, L17. The PHANGS-JWST Treasury Survey: Star Formation, Feedback, and Dust Physics at High Angular Resolution in Nearby GalaxieS
14. Astropy Collaboration. 2022. *ApJ*, 935, 167. The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package
15. Leroy et al. 2021. *ApJS*, 257, 43. PHANGS-ALMA: Arcsecond CO(2-1) Imaging of Nearby Star-forming Galaxies
16. Leroy et al. 2021. *ApJS*, 255, 19. PHANGS-ALMA Data Processing and Pipeline
17. Zucker et al. 2021. *ApJ*, 919, 35. On the Three-dimensional Structure of Local Molecular Clouds

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ADVISING

Mentored 1 graduate student and 14 undergraduate students and interns (10 at CfA/SAO; 4 undergraduate research theses).

Graduate Students:

Hailey Moore | Michigan State University
Research Advisor for Masters Research (*Now staff at Epic)*, advised with L. Chomiuk
A Radio to X-ray Census of Stellar Feedback in the giant HII region NGC 604 2021-2023

Undergraduate Students and Interns:

Helena Bouchereau| Northeastern University Winter 2024 - Present
Karl Nicholson | Trinity College Fall 2023
Sirina Prasad | Harvard University Summer 2023 - Present
- ➢ Presented at AAS 243

Devisree Tallapaneni | Cornell University Summer 2023 - Present
- ➢ Presented at AAS243

Tovi Sonnenberg | Harvard University Summer 2023
- ➢ Presented at Harvard Heidelberg Star formation workshop in Oct. 2023

Ramisa Rahman | William & Mary College Summer 2023
- ➢ Presented at AAS243

Courtney Carreira | Johns Hopkins University Summer 2022 - 2023
- ➢ Presented at AAS241

Kimberly Armas | Harvard University Summer 2022
Noa Choi | Harvard University Summer 2021
Wasiim Ouro-Sama | University of Massachusetts, Lowell Summer 2021
Sam Fielder | University of Alberta Summer 2020
Dewanshu Haswani | University of Alberta Summer 2018
Weizhuo Zhang | University of Alberta Fall 2018
Steffen Senychna | University of Alberta Fall 2018

TEACHING

Astronomy 191 | Harvard University Winter 2023
- ➢ Co-led Submillimeter Array and Interferometry lab project for 6 students, incl. lecturing, course material development, and grading written reports and oral presentations.

Astronomy 191 | Harvard University Winter 2022
- ➢ Co-led Submillimeter Array and Interferometry lab project for 4 students, incl. lecturing, course material development, and grading written reports and oral presentations.

Teaching Assistant | University of Alberta 2014-2018
- ➢ Exam supervision, grading for 100-, 200-, and 300- level Astronomy and Physics courses
- ➢ Laboratory section lead for 6 100-level Engineering Physics courses

Teaching Assistant | University of British Columbia, Okanagan 2011-2013
- ➢ Grading for 100-level Astronomy and Physics courses
- ➢ Laboratory section lead for 8 100- and 200-level Physics lab courses
- ➢ In-lecture assistant for 100-level “flipped-classroom” Physics lectures

Certifications:

Graduate Teaching and Learning Level 1 Certificate | University of Alberta 2017
- 14 hr of workshops on teaching practices, mental health and well-being

SELECTED PRESENTATIONS

Given 21 invited talks (incl. 6 colloquia) and numerous contributed presentations.

Invited talks:

Star Formation and ISM Seminar | Princeton University	2024 Feb
Galaxy Formation Seminar | Flatiron Institute	2024 Feb
Galaxy Evolution Seminar | Oxford University (remote)	2024 Jan
Astronomy Seminar | University of Wisconsin, Madison	2023 Nov
Alumni talk at Graduate Physics Symposium | University of Alberta (remote)	2023 Sep
Astronomy Seminar | University of Hertfordshire (remote)	2023 Jun
Astronomy Seminar | Tufts University	2023 Feb
ALMA Science in Nearby Galaxies: ALMA Status and Plans for Increased Capability | AAS 241	2023 Jan
Astronomy Seminar | McGill University	2022 Dec
CfA Seminar | Center for Astrophysics	2022 Mar
Science Community Webinar | Green Bank Observatory	2022 Feb
Astronomy Seminar | University of Wisconsin, Madison	2021 Nov
Colloquium | Green Bank Observatory (remote)	2021 Oct
Colloquium | ICRAR/Curtin University (remote)	2021 Oct
Colloquium | NRAO/University of Virginia (remote)	2021 Aug
Colloquium | Tsinghua University (remote)	2021 Apr
Astronomy Seminar | University of Connecticut (remote)	2021 Mar
Colloquium | University of Florida (remote)	2020 Jul
Astronomy Seminar | Michigan State University (remote)	2020 Jul
Colloquium | Green Bank Observatory	2019 Apr
Invited Talk | Big Apple Magnetic Fields Workshop	2019 Jan

LEADERSHIP & PROFESSIONAL ACTIVITIES

Referee for MNRAS, A&A, ApJ, PASP 2018-Present

CfA Equity, Diversity, Inclusion and Belonging committee 2023-Present
- Co-lead subcommittee on professional development

Member of SKA SWGs: HI and extragalactic spectral lines 2023-Present
ngVLA SWG3: Galaxies and Galaxy Evolution Member 2022-Present

JWST Cycle 2 External panelist - Stellar populations and ISM 2023
Submillimeter Array Time Allocation Committee 2022-Present
HST Cycle 30 & 31 external reviewer 2022/2023

SOC Chair – Spatio-spectral modeling of ALMA data cubes: Insights and Challenges for ALMA-2030 2024
SOC & LOC Chair: "Northeastern Star and Planet Formation Meeting" 2023
LOC: "Harvard-Heidelberg Star formation workshop" 2023
SOC and LOC: "Seeing the Future – A Conference in Honor of Alyssa Goodman" 2022
SMA Science Seminar Organizer 2021-2023
- ➢ Co-organized weekly seminar series on radio/sub-mm/mm interferometry and related topics

Project advisor: " International Summer School on the Interstellar Medium of Galaxies" 2021
- ➢ Led a group of 6 students in a 2-week project on turbulence statistics in the interstellar medium

LOC, Instructor, and Lecturer – SMA Interferometry Schools 2021/2022/2023
- ➢ Led groups of 4-6 students on tutorials for radio and sub-mm interferometry
- ➢ Developed python tutorials for SMA observations used by all participants
- ➢ Lectures on error recognition in visibilities

Seminar and journal club organizer for UAlberta Astronomy Group 2017-2019
- ➢ Co-led development of student-led weekly talk series
- ➢ Organized "soft-skill" development seminars for the Astronomy group (effective presentations, visualization, …)

UAlberta representative – Canadian Astronomical Society Graduate Student Committee 2016-2017
- ➢ Co-organized student workshop at CASCA 2017 on effective paper writing

Physics representative – Quantitative Sciences Course Union Council, UBC Okanagan 2014

Member of the American Astronomical Society 2021-Present
Student Member of the Canadian Astronomical Society (CASCA) 2017-2020

SELECTED OUTREACH

I have given many public outreach talks, including >100 presentations for visiting school classes and various community groups at the University of Alberta observatory.

Astronomy Research Stories | Cronyn Observatory (remote) 2020 Nov
Observatory Presenter | University of Alberta Observatory 2016-2019
- ➢ Public presentations and scheduling for community groups and Grade 3-12 classes, including ~weekly participation in the USchool program to support rural and underprivileged schools
- ➢ Developed public outreach material for presentation on meteorites, aurora, and star formation
- ➢ Led Solar and night-time public observing

Panel Member | NASA/CSA Space Apps Challenge, Edmonton, Canada 2019 Oct
Outreach Talk | Pint of Science, Edmonton, Canada 2019 May
Outreach Talk | Royal Astronomical Society of Canada, Edmonton 2018 Dec
Outreach Talk | Northern Alberta Radio Club 2018 May

PRESS

Phys.org | JWST sets a new record, sees newly forming stars in the Triangulum galaxy 2023 Dec

REFERENCES

Prof. Erik Rosolowsky | University of Alberta rosolowsky@ualberta.ca
Prof. Adam Leroy | The Ohio State University leroy.42@osu.edu
Prof. Alyssa Goodman | Harvard University agoodman@cfa.harvard.edu