Eric W. Koch
Curriculum Vitæ

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Education

2016-expected July 2020 *University of Alberta*
PhD. (Physics)
Thesis: "The Molecular and Atomic Interstellar Medium in the Local Group"
Adviser: Prof. Erik Rosolowsky

2014-2016 *University of Alberta*
MSc. (Physics)
Thesis: "The Atomic Interstellar Medium in M33"
Adviser: Prof. Erik Rosolowsky

2010-2014 *University of British Columbia*
Hon. BSc. (Physics)

Employment

2014–present *University of Alberta*
Graduate Research and Teaching Assistant

2013-2014 *University of British Columbia, Okanagan*
Undergraduate Research Assistant with Prof. Jason Loeppky

2012 *University of British Columbia, Okanagan*
Undergraduate Work-Study Program with Prof. Erik Rosolowsky

2011-2014 *University of British Columbia, Okanagan*
Undergraduate Teaching Assistant

Awards

2020 *University of Alberta*
Alberta Graduate Excellence Scholarship

2019 *University of Alberta*
Andrew Stewart Memorial Graduate Prize

2019 *University of Alberta/The Ohio State University*
Natural Sciences and Engineering Research Council of Canada Michael Smith Foreign Study Supplements with Prof. Adam Leroy

2018 *University of Alberta*
Queen Elizabeth II Graduate Scholarship - Doctorate

2017-2019 *University of Alberta*
Natural Sciences and Engineering Research Council of Canada Alexander Graham Bell Canada Graduate Scholarship - Doctorate

2016 *University of Alberta*
Natural Sciences and Engineering Research Council of Canada Postgraduate Scholarship - Doctorate

2015 *University of Alberta*
Queen Elizabeth II Graduate Scholarship - Masters

2010-2014 *University of British Columbia, Okanagan*
Deputy Vice Chancellor Scholarship

2014 *University of British Columbia, Okanagan*
Distinguished Graduate Award - Physics, Math, Statistics & Computer Science

2014 *University of Alberta*
Natural Sciences and Engineering Research Council of Canada Alexander Graham Bell Canada Graduate Scholarship - Masters

2013 *University of Alberta*
Natural Sciences and Engineering Research Council of Canada Undergraduate Summer Research Award with Prof. Craig Heinke

2013 *University of British Columbia, Okanagan*
Top Oral Presenter - UBC-O Undergraduate Research Conference

2013 *University of British Columbia, Okanagan*
Upper Year Physics Award

2012 *University of British Columbia, Okanagan*
Natural Sciences and Engineering Research Council of Canada Undergraduate Summer Research Award with Prof. Erik Rosolowsky

2010 *University of British Columbia, Okanagan*
President's Entrance Scholarship

External Funding

2019 **co-I** - *Link CASA to the astropy ecosystem*
ALMA Development Studies - Cycle 7
$199,905 USD

Professional Talks

2020 July *Michigan State University, USA*
"Unravelling Atomic ISM Physics Across the Local Group"

2019 September *So-Star, Paris, France*
"HI & CO kinematics on molecular cloud scales in the Local Group"

2019 April *Center for Astrophysics, Cambridge, USA*
"Connecting atomic and molecular ISM kinematics on cloud scales in M33"

2019 April *Green Bank Telescope, Green Bank, USA*
"Connecting atomic and molecular ISM kinematics on cloud scales in M33"

2019 March *NRAO, Charlottesville, USA*
"Connecting atomic and molecular ISM kinematics on cloud scales in M33"

2019 March *University of Texas, Austin, USA*
"Connecting atomic and molecular ISM kinematics on cloud scales in M33"

2019 January *Big Apple Magnetic Fields Workshop, New York, USA*
"Turbustat: Python-based turbulence statistics"

2018 August *CHANG-ES Team Meeting, Calgary, Canada*
"De-obfuscating HI & CO Comparisons in M33"

2018 July *PHAT/M33 Team Meeting, Ringberg, Germany*
"Atomic Gas in M31 and M33"

2018 May *Olympian Symposium, Paralia Katerini, Greece*
"Spatially-Varying Turbulent Properties in M33"

2017 June *Canadian Astronomical Society (CASCA) Meeting, Edmonton, Canada*
"Linking the Atomic and Molecular ISM in M33"

2016 August *Lorentz Centre - Apples to Apples Workshop*
"Identifying Tools for Comparing Simulations and Observations of Star-forming Regions"

2016 February *Max Planck Institute for Extraterrestrial Physics*
"Comparing Simulations and Observations of Star Formation using Experimental Design"

Poster Presentations

2019 June *Linking the Milky Way and Nearby Galaxies, Helsinki, Finland*
"Connecting atomic and molecular ISM kinematics on cloud scales in M33"

2013 June *Canadian Astronomical Society Conference (Vancouver, Canada)*
"Converging Flows in Star-Forming Regions"

Observing Experience

- Three VLA projects as PI (180 hours awarded; 16B-236, 16B-242, 17B-162); one as co-I (24 hours awarded; 19B-037)
- One ALMA project as PI (8 hours awarded; 2019.1.01039.S); two as co-I (22 hours awarded; 2017.1.00901.S, 2019.1.01182.S)
- One GBT project as PI (41 hours awarded; 19B-221)
- One NOEMA project as co-I (16 hours awarded; W15BR)

Professional Service and Training

2018-Present	Referee for Monthly Notices of the Royal Astronomical Society
2017-2019	Seminar and journal club organizer for UAlberta Astronomy Group
2017-2018	Student Member of Canadian Astronomical Society (CASCA)
2017	U. Alberta Graduate Teaching and Learning Level 1 Certificate – 14 hrs. of workshops
2017	U. Alberta representative on the Canadian Astronomical Society Graduate Student Committee
2013-2014	UBC-Okanagan Physics representative on Quantitative Sciences Course Union Council

Research Advising

I have acted as a research advisor for three undergraduate students at the University of Alberta, supervised by Prof. Erik Rosolowsky.

Summer 2018	*Interpreting filaments in three dimensions* Dewanshu Haswani MITACS Internship
Fall 2018	*Spiral Arm Propagation in M33 and its Implications on Molecular Cloud Formation* Steffen Senchyna Physics 499 Honours Research Project
Fall 2018	*ISM Properties near Supernova Remnants in M33* Weizhuo Zhang Physics 499 Honours Research Project

Software

I actively develop several python software packages for astronomical analyses. Below is a selection of my primary projects, and a full list is available on my github profile (github.com/e-koch).

- `TurbuStat` (https://turbustat.readthedocs.io): A common implementation of many observational turbulence statistics. (Koch et al. 2019).
- `FilFinder` (https://fil-finder.readthedocs.io): Morphological-based filament detection algorithm (Koch & Rosolowsky 2015).
- `spectral-cube` (https://spectral-cube.readthedocs.io): A library for operations on radio spectral-line data cubes, including handling for massive data (DOI: 10.5281/zenodo.2573901).

Outreach

2019 October	*Edmonton, Canada* "Judge for NASA/CSA Space Apps Challenge"
2019 May	*Pint of Science, Edmonton, Canada* "Frigid Fuel for Star Formation"
2018 December	*Royal Astronomical Society of Canada (Edmonton Centre)* "Unravelling Star Formation"
2018 May	*Northern Alberta Radio Club (Edmonton)* "Viewing the Sky with Radio Interferometry"
2017 February	*University of Alberta Observatory Public Observing Night* "Blowing Bubbles in a Galaxy"
2016–2019	*University of Alberta Observatory* "Public Observing & School Tours"

Publications

I have authored 13 refereed publications (7 as first author) and my publications have 167 citations. I currently have two papers under review.

Refereed

13. JD Henshaw, JMD Kruijssen, SN Longmore, M Riener, AK Leroy, E Rosolowsky, A Ginsburg, C Battersby, M Chevance, SE Meidt, SCO Glover, A Hughes, J Kainulainen, RS Klessen, E Schinnerer, A Schruba, H Beuther, F Bigiel, GA Blanc, E Emsellem, T Henning, CN Herrera, **EW Koch**, J Pety, SE Ragan, J Sun. *"Ubiquitous velocity fluctuations throughout the molecular interstellar medium."* 2020, NatAs 136H [4 citations].

12. CO Heinke, MG Ivanov, **EW Koch**, R Andrews, L Chomiuk, HN Cohn, S Crothers, T Boer, N Ivanova, AKH Kong, N Leigh, PM Lugger, L Nelson, CJ Parr, EW Rosolowsky, AJ Ruiter, CL Sarazin, AW Shaw, GR Sivakoff, M Berg. *"The X-ray Emissivity of Low-Density Stellar Populations."* 2020, MNRAS 492 5684 [1 citation].

11. **EW Koch**, I Chiang, D Utomo, J Chastenet, AK Leroy, EW Rosolowsky, KM Sandstrom. *"Spatial Power Spectra of Dust across the Local Group: No Constraint on Disc Scale Height."* 2020, MNRAS 492 2663.

10. **EW Koch**, EW Rosolowsky, RD Boyden, B Burkhart, A Ginsburg, JL Loeppky, SSR Offner. *"TurbuStat: Turbulence Statistics in Python."* 2019, AJ 158 1 [6 citations].

9. **EW Koch**, EW Rosolowsky, A Schruba, A Leroy, AA Kepley, J Braine, J Dalcanton, MC Johnson. *"Relationship between the Line Width of the Atomic and Molecular ISM in M33."* 2019, MNRAS 485 2324 [3 citations].

8. **EW Koch**, EW Rosolowsky, FJ Lockman, AA Kepley, A Leroy, A Schruba, J Braine, J Dalcanton, MC Johnson, S Stanimirović. *"Kinematics of the atomic ISM in M33 on 80 pc scales."* 2018, MNRAS 479 2505-2533 [10 citations].

7. RD Boyden, SSR Offner, **EW Koch**, EW Rosolowsky. *"Assessing the Impact of Astrochemistry on Molecular Cloud Turbulence Statistics."* 2018, ApJ 860 157 [5 citations].

6. **EW Koch**, CG Ward, S Offner, J Loeppky, E Rosolowsky. *"Identifying Tools for Comparing Simulations of Star Formation."* 2017, MNRAS 471 1506-1530 [14 citations].

5. Y Lin, HB Liu, JE Dale, D Li, G Busquet, ZY Zhang, A Ginsburg, R Galvan-Madrid, A Kovacs, **E Koch**, L Qian, K Wang, S Longmore, HR Chen, D Walker. *"Cloud Structure of Three Galactic Infrared Dark Star-forming Regions from Combining Ground- and Space-based Bolometric Observations."* 2017, ApJ 840 22 [19 citations].

4. RD Boyden, **EW Koch**, EW Rosolowsky, SSR Offner. *"An Exploration of the Statistical Signatures of Stellar Feedback."* 2016, ApJ 833 233 [11 citations].

3. Y Lin, HB Liu, D Li, Z-Y Zhang, A Ginsburg, JE Pineda, L Qian, R Galván-Madrid, AF McLeod, E Rosolowsky, JE Dale, K Immer, **E Koch**, S Longmore, D Walker, L Testi. *"Cloud Structure of Galactic OB Cluster-forming Regions from Combining Ground and Space-based Bolometric Observations."* 2016, ApJ 828 32 [25 citations].

2. **EW Koch**, EW Rosolowsky. *"Filament Identification through Mathematical Morphology."* 2015, MNRAS 452 3435-3450 [65 citations].

1. **EW Koch**, A Bahramian, CO Heinke, K Mori, N Rea, N Degenaar, D Haggard, R Wijnands, G Ponti, JM Miller, F Yusef-Zadeh, F Dufour, WD Cotton, FK Baganoff, MT Reynolds. *"The 2013 outburst of a transient very faint X-ray binary, 23 arcsec from Sgr A∗."* 2014, MNRAS 442 372-381 [4 citations].

Submitted

1. N Krieger, AD Bolatto, **EW Koch**, AK Leroy, E Rosolowsky, F Walter, A Weiss, DJ Eden, RC Levy, DS Meier, EAC Mills, T Moore, J Ott, Y Su, S Veilleux. *"The turbulent gas structure in the centers of NGC253 and the Milky Way."* 2020, ApJ submitted.

Non-refereed

2. **E Koch**, E Rosolowsky, AK Leroy. *"Radio-line Broadening from a Spectral Response Function."* 2018, RNAAS 2 220 [5 citations].

1. **E Koch**, E Rosolowsky, MC Johnson, AA Kepley, A Leroy. *"Detection of an OH 1665 MHz Maser in M33."* 2018, RNAAS 2 24 [1 citation].