

Christopher J. Anderson

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EDUCATION

PhD Physics 2017
University of Wisconsin Madison
Thesis: *Studying Cosmic Evolution with 21 cm Intensity Mapping*
Advisor: Prof. Peter Timbie

BA Physics (with honors) and BA Applied Math 2009
University of California Berkeley

PROFESSIONAL HISTORY

Johns Hopkins University, Goddard Space Flight Center 2018-present
Assistant Research Scientist

University of Wisconsin-Madison Sept. 2017- Dec. 2017
Postdoctoral Researcher

University of Wisconsin-Madison 2010-2017
Graduate Student Teaching/Research Assistant

Lawrence Berkeley National Laboratory 2009-2010
Research Assistant

RESEARCH INTERESTS

Constraining the dark energy equation of state through clustering analysis.

Combining intensity maps with galaxy surveys to probe matter clustering and the environment of star formation

Development of Spherical Harmonic Tomography (SHT) as the primary analysis tool for wide and deep matter clustering surveys.

Understanding star formation history through measuring bright atomic and molecular lines.

PUBLICATIONS

Christopher J. Anderson, Eric R. Switzer, and Patrick C. Breysse. *Constraining low redshift [CII] Emission by Cross-Correlating FIRAS and BOSS Data*, arXiv:2202.00203, submitted to Monthly Notices of the Royal Astronomical Society.

P.A.R. Ade, **C. J. Anderson**, E.M. Barrentine, N.G. Bellis, A.D. Bolatto, P. C. Breysse, B. T. Bulcha, G. Cataldo, J. A. Connors, P. W. Cursey, and others. *The Experiment for Cryogenic Large-Aperture Intensity Mapping (EXCLAIM)*, Journal of Low Temperature Physics p. 1-11, 2020.

- Cataldo, Giuseppe, Peter AR Ade, **Christopher J. Anderson**, Alyssa Barlis, Emily M. Barrentine, Nicholas G. Bellis, Alberto D. Bolatto et al. *Overview and status of EXCLAIM, the experiment for cryogenic large-aperture intensity mapping*. In Ground-based and Airborne Telescopes VIII, vol. 11445, p. 1144524. International Society for Optics and Photonics, 2020.
- Essinger-Hileman, Thomas, Trevor Oxholm, Gage Siebert, Peter Ade, **Christopher Anderson**, Alyssa Barlis, Emily Barrentine et al. *Optical design of the experiment for cryogenic large-aperture intensity mapping (EXCLAIM)*. In Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X, vol. 11453, p. 114530H. International Society for Optics and Photonics, 2020.
- Breysse, Patrick C., **Christopher J. Anderson**, and Philippe Berger. *Canceling out intensity mapping foregrounds*, Physical Review Letters 123, 231105, 2019.
- Das, Santanu, **Christopher J. Anderson**, Reza Ansari, Jean-Eric Campagne, Daniel Charlet, Xuelei Chen, Zhiping Chen et al. *Progress in the construction and testing of the Tianlai radio interferometers*, In Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy IX, vol. 10708, p. 1070836. International Society for Optics and Photonics, 2018.
- Ade, P.A.R., **Anderson, C.J.**, Barrentine, E.M., Bellis, N.G., Bolatto, A.D., Breysse, P.C., Bulcha, B.T., Cataldo, G., Connors, J.A., Cursey, P.W. and Ehsan, N. (2019). *The Experiment for Cryogenic Large-Aperture Intensity Mapping (EXCLAIM)*, 18th International Workshop on Low Temperature Detectors; July 22, 2019 - July 26, 2019; Milan; Italy.
- Switzer ER, **Anderson CJ**, Pullen AR, Yang S. *Intensity Mapping in the Presence of Foregrounds and Correlated Continuum Emission*, The Astrophysical Journal. 2019 Feb 12;872(1):82.
- C.J. Anderson**, N.J. Luciw, Y.-C. Li, C.-Y. Kuo, J. Yadav, K.W. Masui, T.-C. Chang, X. Chen, N. Oppermann, Y.-W. Liao, U.-L. Pen, D.C. Price, L. Staveley-Smith, E.R. Switzer, P.T. Timbie, L. Wolz, *Low-amplitude clustering in low-redshift 21-cm intensity maps cross-correlated with 2dF galaxy densities*, Monthly Notices of the Royal Astronomical Society. 2018 Feb 9;476(3):3382-92.
- Aleksander J. Cianciara, **Christopher J. Anderson**, Xuelei Chen, Zhiping Chen, Jingchao Geng, Jixia Li, Chao Liu, Tao Liu, Wing Lu, Jeffrey B. Peterson, Huli Shi, Catherine N. Steffel, Albert Stebbins, Thomas Stucky, Shijie Sun, Peter T. Timbie, Youngang Wang, Fengquan Wu and Juyong Zhang, *Simulation and Testing of a Linear Array of Modified Four-Square Feed Antennas for the Tianlai Cylindrical Radio Telescope*, Journal of Astronomical Instrumentation, Vol. 6, No. 3 (2017).
- L. Wolz, C. Blake, F. B. Abdalla, **C.J. Anderson**, T.-C. Chang, Y.-C. Li, K.W. Masui, E. Switzer, U.-L. Pen, T.C. Voytek, J. Yadav, *Erasing the Milky Way: new cleaning technique applied to GBT intensity mapping data*, MNRAS (2016).
- Kiyoshi Masui, Hsiu-Hsien Lin, Jonathan Sievers, **Christopher J. Anderson**, Tzu-Ching Chang, Xuelei Chen, Apratim Ganguly, Miranda Jarvis, Cheng-Yu Kuo, Yi-Chao Li, Yu-Wei Liao, Maura McLaughlin, Ue-Li Pen, Jeffrey B. Peterson, Alexander Roman, Peter T. Timbie, Tabitha Voytek, Jaswant K. Yadav, *Dense magnetized plasma associated with a fast radio burst*, Nature (2015).
- Y.-J. Hwang, C.-C. Lin, C.-T. Ho, C.-C. Chuang, C.-C. Chiong, J. Peterson, **C. Anderson**, P. Timbie, S. White, S. Srikanath, T.-C. Chang, *700 - 945 MHz Dual-Polarized Short Backfire Antenna with Integrated Cryogenic Low-Noise Amplifiers for Green Bank Telescope*, 2013 Asia-Pacific Radio Science Conference, Taipei, Taiwan, Sept. 2013.
- Christopher Anderson**, *Developing a Focal Plane Array at the GBT for 21 cm Astronomy*, Proceedings of the 22nd Annual Wisconsin Space Conference, Aug. 2012.

GRANTS AND AWARDS

Co-author on 3 successful proposals for observing time on the Green Bank Telescope	2014, 2015, 2017
First author of successful proposal for observing time on the Green Bank Telescope	2013
Jansky Scholarship	2013
Wisconsin Space Grant Consortium Graduate Fellowship	2012-2013, 2016
Van Vleck Award	2012

CONFERENCE AND WORKSHOP ACTIVITY

KICP Line Intensity Mapping Workshop Title: <i>Filling in the Layers: Spherical Harmonic Tomography</i>	2021
Lines in the Large Scale Structure conference Title: $C_\ell(z, z')$ Analysis for Line Intensity Mapping	2019
Poster at the 230th AAS conference	2017
Attended 14th NRAO Synthesis Imaging Workshop	2014

SKILLS

Programming data reduction pipelines for large data sets, utilizing parallel processing in a computing cluster. I have written and used pipelines that go from time-ordered data to maps, to power spectra, to final parameter estimates and error bars.

Proficient with Singular Value Decomposition Principal Component Analysis as a foreground removal method in intensity mapping.

Designing microwave frequency components and simulating their performance with CST Microwave Studios, via finite element methods (FEM) analysis or method of moments (MoM).

Proficient in the following programming languages: **Python**, **MATLAB**, **Mathematica**. Familiar with: **C**, **Fortran**, **Java**.

TEACHING AND MENTORING

Four years as teaching assistant for undergraduate physics courses: Physics in the Arts, Mechanics for Scientists and Engineers, and Electricity and Magnetism.

Supervised undergraduate student Aleks Cianciara (now a graduate student at Brown) in electromagnetic simulations of the Tianlai dark energy radio telescope.

Supervised undergraduate student Ben Hoschiet in simulations of foreground systematics for 21 cm intensity mapping.

Participated in the UW Madison Wonders of Physics outreach event from 2013 to 2017