

Physics and Astrophysics Special Seminar

Thursday, February 25, 2021

1:00 p.m.

Innovative Approaches in mm-Wavelength Cosmology: From Inflation to the Epoch of Reionization and Beyond

Abigail Crites

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I will describe how I use mm-wavelength instruments (both spectrometers and photometers) to explore our universe across cosmic time and to probe fundamental physics. I will describe some of my primary science interests, the epoch of reionization, star formation across cosmic time, and cosmology using the cosmic microwave background (probing inflation and neutrino physics), and discuss the development of instrumentation and data analysis tools to study these areas. I will motivate these plans with a discussion of TIME, the pathfinder instrument I am leading for studying reionization with mm-wavelength line intensity mapping, and discuss the role that the expertise we have built in the development of new instrumentation and data analysis for scientific discovery can play in the success of future instruments such as TIME-EXT and CCAT-prime. I will discuss models for expected signals from current and future instruments and discuss what we can learn from combining data from mm-wavelength spectrometers with other instruments, such as 21 cm instruments, ALMA, HST, and in the future, JWST, which probe similar epochs. I will also discuss CMB-S4, a next generation cosmic microwave background experiment that will probe cosmology, the early universe, and neutrino physics.

Abigail Crites is an Assistant Professor at the University of Toronto in the Department of Astronomy and Astrophysics and the Dunlap Institute. Crites completed her postdoctoral research at Caltech where she was a National Science Foundation Astronomy and Astrophysics Postdoctoral Fellow and a Keck Institute for Space Studies Postdoctoral Fellow. Her PhD research at the University of Chicago was focused on building an instrument called SPTpol with a team of researchers to measure the polarization of the cosmic microwave background. She has an undergraduate degree in Physics from Caltech. Crites' research involves investigating the early universe (< 1 billion years after the Big Bang) through the development and use of mm-wavelength instruments which she deploys on telescopes to study early galaxies during the epoch of reionization and the cosmic microwave background radiation. She focuses on using measurements with these instruments to significantly enhance our understanding of astrophysics, fundamental physics, cosmology, and the large-scale structure of the universe.