



## Probing the Epoch of Reionization with the TIME-Pilot [CII] Intensity Mapping Experiment

**Main author:**

CRITES Abigail

**Co-authors:**

Bock Jamie, Caltech/JPL  
Bradford Matt, Caltech/JPL  
Chang Tzu-Ching, ASIAA  
Cheng Yun-Ting, ASIAA  
Cooray Asantha, UC Irvine  
Crites Abigail, Caltech  
Gong Yan, NAOC  
Hailey-Dunsheath Steve, Caltech  
Hunacek Jonathon, Caltech  
Koch Patrick, ASIAA  
Li Chao-Te, ASIAA  
O'Brient Roger, Caltech  
Shirokoff Erik, University of Chicago  
Staniszewski Zak, Caltech  
Uzgil Bade, U. Penn  
Zemcov Mike, Caltech

I will present an overview of TIME-Pilot (the Tomographic Ionized carbon Intensity Mapping Experiment), a new imaging spectrometer designed to probe the epoch of reionization (EoR) by intensity mapping the line emission from ionized carbon ([CII]) from early galaxies. I will describe how this novel mm-wavelength cryogenic instrument will allow us to detect [CII] clustering fluctuations and test the predicted [CII] amplitudes from faint emission from dwarf galaxies. TIME offers a unique way to measure these faint sources which will be difficult to detect individually with JWST and ALMA. TIME is also complimentary to other intensity mapping experiments including 21-cm instruments which measure the neutral rather than ionized medium. In addition to this primary EoR science goal, TIME-Pilot will make unique kSZ measurements of

galaxy clusters through our ability to cleanly subtract atmosphere with monitor channels. It will also robustly detect CO clustering at low  $z$ .

The TIME-Pilot instrument will be sensitive to a wavelength range of  $\sim 200 - 300$  GHz with  $R = 100$ , which will allow us to measure the redshifted  $157.7 \mu\text{m}$  [CII] line from  $z$  of 5 to 9, key redshifts for probing the EoR. The instrument will be housed in a 4K / 1K cryostat with a  $^3\text{He}$  sorption cooler used to cool the spectrometers and detectors to 250 mK. The focal plane unit consists of 32 grating spectrometers and 1920 TES bolometers. A SQUID multiplexing system is used to read out the bolometers. I will describe how our science case shaped the instrument design and survey strategy, and report on the status of the project.