
Intensity Mapping of Molecular Gas with the Yuan-Tseh Lee Array

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Abstract

The origin and evolution of structure in the Universe is one of the major challenges of observational astronomy. How and when did the first stars and galaxies form? How does baryonic structure trace the underlying dark matter? A multi-wavelength, multi-tool approach is necessary to provide the complete story or the evolution of structure in the Universe. In particular, our understanding of the molecular gas component of massive galaxies is being revolutionized by ALMA and EVLA but the population of smaller, star-forming galaxies, which provide the bulk of star formation, cannot be individually probed by these instruments. In this talk, I will summarize our intensity mapping experiment to detect molecular gas through the carbon monoxide (CO) rotational transition using the Yuan-Tseh Lee Array (YTLA), a compact, platform-based interferometer located on Mauna Loa, Hawaii. In its first phase, this project focuses on detection of CO at redshifts 1 - 3 with detection via power spectrum and cross-correlation with other surveys. In 2018 we concluded a major technical upgrade with the installation of a new digital correlator and associated analog IF electronics. I will give an update on commissioning and early science observations. YTLA observations will be more sensitive and extend to larger angular scales than SZA-COPSS observations, which produced the first tentative IM detection of CO at redshift 3.

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