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The EXperiment for Cryogenic Large-aperture Intensity Mapping (EXCLAIM)

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The EXperiment for Cryogenic Large-aperture Intensity Mapping (EXCLAIM) is a high altitude balloon spectrometer designed to deepen our understanding of star formation in a cosmological context. Rather than identifying individual objects, as in a galaxy redshift survey, EXCLAIM will be a pathfinder to demonstrate an intensity mapping (IM) approach. EXCLAIM will operate at 424 –540 GHz with a spectral resolution of $R=512$ to measure the integrated line emission from galaxies and the intergalactic medium (IGM). The instrument is ideal for observing CO and [CII] line emissions from the nearby universe out to redshifts of $z\sim 3.5$. CO and [CII] line emissions are key tracers of the gas phases in the interstellar medium involved in star-formation processes. EXCLAIM will shed light on questions such as why the star formation rate declines and breaks away from the cosmological evolution of dark matter at redshifts of $z\sim 2$. The instrument will employ an array of six superconducting integrated grating-analog spectrometers (μ -Spec) with superconducting microwave kinetic inductance detectors (KIDs) in an all-cryogenic telescope (1.5K) to achieve near background-limited sensitivity. Here we present an overview of the EXCLAIM instrument and status.

Less than 5 years of experience since completion of Ph.D

N

Student (Ph.D., M.Sc. or B.Sc.)

N

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