



ID de Contribution: 98

Type: Non spécifié

The EXperiment for Cryogenic Large-Aperture Intensity Mapping (EXCLAIM): status and forecasts

mardi 3 juin 2025 15:55 (15 minutes)

EXCLAIM is a balloon-borne cryogenic telescope that will use the line intensity mapping technique to survey the spectrum of diffuse emission from both the Milky Way and the cosmic web to probe star formation, the interstellar medium, and galaxy evolution across cosmic time. EXCLAIM's primary extragalactic science survey will map 305 deg² with angular resolution 4 arcmin in the SDSS Stripe 82 field. Its focal plane includes 6 on-chip spectrometers based on kinetic inductance detectors. The spectrometers have spectral resolving power $R = 512$ over the frequency range $\nu = 420 - 540$ GHz and target emission of the [CII] line over redshifts $2.5 < z < 3.5$ and several CO lines for $z < 1$. The spectral resolving power and cryogenic telescope allow the survey to access dark windows in the spectrum of emission from the upper atmosphere. Cross-correlation with galaxy redshift catalogs isolates line emission from the large-scale structure at target redshifts. I will discuss the status of the hardware development, mission planning, the data analysis pipeline, and sensitivity forecasts.

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Classification de Session: Contrinbuted Talks 7: EXCLAIM/TIM/TIFUUN/SPTSLIM