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Cosmology with On-Chip Superconducting Millimeter-Wave Spectrometers

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Line intensity mapping (LIM) is an emerging observational technique to measure the large-scale structure of the Universe in three dimensions, traced by a redshifted emission line, without resolving individual objects. Future experiments promise to extend the observable volume beyond the redshift reach of traditional galaxy surveys, improving precision on the Λ CDM cosmological model and extensions to it. I will outline the science potential of mm-wave LIM experiments, highlighting the need for on-chip spectrometers to dramatically improve sensitivity over current instruments. I will introduce SPT-SLIM, a pathfinder for the South Pole Telescope that will demonstrate LIM using on-chip spectrometers. Finally I will discuss how this technology could power future LIM instruments with orders of magnitude more detectors and the sensitivity to constrain the expansion history at high redshift, primordial non-Gaussianity, and more.

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