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THE LMT GALAXIES'3MM SPECTROSCOPIC SURVEY: MOLECULES AS TRACERS OF ACTIVITY IN GALAXIES

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The study of the molecular gas is fundamental for the understanding of the highly enshrouded, compact nuclear regions in galaxies, as well as the onset and evolution of star formation and the growth of supermassive black holes. Unbiased extragalactic molecular line surveys at mm wavelengths are mandatory to detect many species and identify those that provide the best information about the physical properties around the nuclear regions. The instantaneous bandwidth of 37 GHz covering frequencies from 73 to 111 GHz of the RSR at the 32m-Large Millimeter Telescope Alfonso Serrano (LMT, Sierra la Negra, Mexico), allows the simultaneous detection of a large number of molecular species and eliminates many systematic problems as varying pointing or calibration problems present in receivers with shorter coverage. We present high signal to noise millimeter spectra of a sample of 23 galaxies spanning a large range in infrared luminosities, nuclear activity, metallicity and morphological types. We started the analysis of their cold and dense molecular content based on molecular line ratios diagnostic diagrams and empirical relations between molecular line intensities and the properties of the host galaxies like nuclear activity, star forming rate, and metallicity.

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SIMULATING LARGE SCALE STRUCTURE WITH LOGNORMAL FIELDS: A NEW CODE AND APPROACH

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It is common practice in cosmology to use lognormal random fields to model large-scale structure observables such as matter density and weak lensing convergence. I will present the public code Full-sky Lognormal Astro-fields Simulation Kit (FLASK) which can make tomographic realizations on spherical shells around the observer of an arbitrary number of correlated lognormal or Gaussian random fields, including the Cosmic Microwave Background (CMB) and multiple tracers of matter. I will show that lognormal fields have fundamental limitations which prevent its use for jointly modelling density and convergence and will propose two ways of overcoming these limitations. The first approach slightly distorts the power spectra of the fields while the second one generates a different weak lensing convergence marginal distribution by integrating the lognormal density along the line of sight. The latter approach also provides a way to determine directly from theory the skewness of the convergence distribution and, therefore, the parameters for a lognormal fit.

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