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Stacking analysis of CO emission based on optical spectroscopic redshifts from MUSE

Wednesday, October 16, 2019 10:10 AM (15 minutes)

Contributed talk

Abstract:
"The origin of the rise of the star formation rate density towards z~1-3, the peak of galaxy growth, could be a large supply of molecular gas for forming stars, or a mechanism which causes high efficiency in star formation, or a combination of the two of these. The ALMA Spectroscopic Survey (ASPECS) project has conducted a spectroscopic survey in the Hubble Ultra Deep Field (HUDF) to perform an unbiased, blind search for CO emission, which traces the fuel of star formation (Gonzalez-Lopez et al. 2019). In order to push the detections of CO emission further, we perform a stacking analysis of the ALMA spectra based on the optical spectroscopic redshifts from another large, unbiased, blind spectroscopic survey in the HUDF carried out by the integral field spectrograph instrument MUSE (Multi Unit Spectroscopic Explorer) on the Very Large Telescope. The wide field-of-view (1'x1'), high sensitivity, wide wavelength coverage, and high spectral resolution of MUSE facilitate spectro scopic redshift measurements without requiring any target preselection, achieving a spatially homogeneous spectroscopic completeness. The MUSE deep survey in the HUDF obtained 1338 high quality redshifts, a factor of eight increase over the previously known spectroscopic redshifts in this field (Inami et al. 2017). In this talk, I will show the results of stacking the CO(2-1) line using the MUSE spectroscopic redshifts and the estimated molecular gas content in bins of stellar mass and star formation rate. This synergy of using the two deepest ever data cubes taken in the optical and the submm/mm plays a key role in making comparisons of galaxies with and without a direct CO detection. We will discuss the detection of CO emission and how it relates to the galaxy gas reservoir and star formation efficiency along the main-sequence relationship. "

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