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Presentation Requested: oral
Category: Assembly of Galaxies / Mass & Structure Evolution
Question: What have we learned or can we learn about galaxies at the Epoch of Reionization with ALMA / what are the synergies with other telescopes? What is the role of ALMA, JVLA and SKA (and other telescopes) for confirming galaxies where Lyman alpha is not detected (i.e. at putative z $>$ 7.5)

Deep Surveys with GISMO : Searching for submillimeter galaxies at the highest redshifts

The GISMO 2 mm camera at the IRAM 30m telescope is available to the astronomical community through the semi-annual IRAM call for proposals. The 2 mm band is in particular well suited to trace the first dusty galaxies in the universe, since their redshifted SEDs peak close to GISMO's observing frequency, whereas the medium redshift galaxy foreground is almost invisible in this band. This effect makes GISMO's deep field observations a valuable complement, rather than a redundancy, to the HERSCHEL far-infrared and sub-mm surveys. There are two ongoing deep sky surveys with GISMO. Following a brief summary of a sample of current projects, I will describe one of those surveys in detail: the GISMO Deep Field (GDF) survey, which is centered on the Hubble Deep Field North. This survey by now has reached the confusion limit (we measure a confusion noise of 60 microJy) and we have extracted 12 + 3 sources in a 7 arcminute wide field, of which roughly half have known submillimeter galaxy counterparts, including the enigmatic submillimeter galaxy SCUBA-850.1. Our detailed statistical analysis of the GDF data provides a solid estimate of the expected rate of false detections among those source identifications. Furthermore, numerical simulations were used, to estimate the "completeness" of our set of extracted sources. A comparison of our observations with model predictions shows that our results are in good agreement with galaxy count models. Simple models predict an appreciable number to be at very high redshifts (z 5-6 and above) with intrinsic luminosities of a few $10^{12} L_{\odot}$. Targeted GISMO observations of even more extreme high redshift galaxies have been obtained during our most recent observing run. I will present preliminary results from these observations, which have the potential to put strong constraints on the formation of dark matter halos and the production of metals in the early universe, and will discuss how follow up observations of these and many other sources with ALMA will enable us to obtain a detailed view of the history of galaxy formation from the time of re-ionization of the universe.