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Caught in the act - massive cluster formation at $z=3-7$ witnessed by APEX/ALMA

Monday, 14 October 2019 12:05 (15 minutes)

Contributed Talk

Abstract:

Finding and tracing the progenitors of today's massive clusters is challenging but observations of these rare systems are rich in information on cluster assembly, including brightest cluster galaxy formation, the build up of the red sequence and intra-cluster light, heating and metal-enrichment in the forming intra-cluster medium, the triggering and quenching of both star-formation and of active galactic nuclei, and the in-fall of matter along filaments of the cosmic web.

In a multi-band survey over 2500 deg², the South Pole Telescope discovered a population of rare, extremely bright ($S_{1.4\text{ mm}} > 20\text{ mJy}$) millimetre-selected sources. Our ALMA 870 μm imaging showed that $\sim 90\%$ of these sources are gravitationally lensed DSFGs at $z \sim 4$. However, $\sim 10\%$ of the SPT sources show no evidence for lensing but break-up into individual galaxies with ALMA and thus show all expected properties of the most active phase of early cluster formation predicted by cosmological simulations. The most spectacular example for this process identified in the SPT survey so far is SPT2349-56 at $z = 4.3$. This source is spatially well resolved at 870 μm even with LABOCA/APEX and breaks up into 30 proto-cluster members with confirmed redshifts from ALMA. The entire system as a stunning SFR of 16500 $M_{\odot}\text{ yr}^{-1}$ and contains 15 (U)LIRGs at its core within a projected radius equal to the MW-LMC distance!

In this talk I will present the latest result of our coordinated attempt to characterise all proto-cluster candidates discovered in the SPT survey.

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Session Classification: Cosmology