Contribution ID: **49** Type: **Talk**

Dust, gas, and star formation in galaxies at z~2 (Irene Shivaei)

Thursday, 12 September 2019 15:45 (18 minutes)

The interstellar medium (ISM) of galaxies is composed of multiple components (molecular, neutral, ionized gas, and dust grains), which are related to each other through star formation —some are fuel for star formation (molecular gas) and some are the products of it (ionized gas, dust). Studying these different components simultaneously is crucial to fully understand the physics of star formation and its evolution throughout cosmic time. Such studies require multi-wavelength spectroscopic and photometric datasets out to high redshifts, which become accessible by combining the power of current and future facilities such as ALMA, JWST and ELTs. I will talk about the main goals of JWST MIRI and NIRCam extragalactic GTO programs, and discuss the synergies between JWST, ALMA, and ELTs to study the gas, dust, and star formation at the peak epoch of cosmic star formation activity, z~1-3. Using JWST/NIRCAM and MIRI we will be able to trace the bulk of stellar mass and hot dust at z~1-3 for large samples of galaxies down to low luminosities, owing to the significantly higher sensitivity of the JWST instruments while retaining spatial resolution comparable to the most powerful current facilities. On the other hand, ALMA gives us the unique opportunity to trace the dust and cool gas content of individual unlensed and typical L* galaxies at z>1 in an efficient way. The optical and near-IR instruments on 10-40-m class telescopes will add important pieces of information to this picture by revealing the stellar and ionized gas properties of faint galaxies at intermediate and high redshifts. The synergies among all these facilities will give us a nearly complete multi-wavelength picture of the evolution of galaxies over a large dynamical range during the peak epoch of cosmic star formation activity.

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Track Classification: Gas and dust in galaxies