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**Presentation Requested: oral**

**Category: Cosmic Star Formation History**

**Question:** What is the origin of the main sequence of star formation and how well are the quantities on the axis measured? What determines the scatter and slope and their evolution with redshift? What drives galaxies off the MS? What are maximal starbursts and how do they evolve?

## **The Star-Formation Rate and Stellar Mass Relation of Galaxies at High Redshift in CANDELS**

Distant star-forming galaxies show a correlation between their star-formation rates (SFR) and stellar masses, and this has deep implications for galaxy formation. In this talk, I present a study on the evolution of the slope and scatter of the SFR-stellar mass relation for galaxies at  $3.5 < z < 6.5$  using multi-wavelength photometry in GOODS-S from the Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey (CANDELS) and Spitzer Extended Deep Survey. We find that over  $3.5 < z < 6.5$  the star-forming galaxies in CANDELS follow a nearly unevolving correlation between stellar mass and SFR that follows  $\text{SFR} \sim M_{\star}^{\alpha}$  with  $\alpha = 0.81 \pm 0.11$  at  $z \sim 6$  and  $0.75 \pm 0.19$  at  $z \sim 4$ . This evolution requires a star-formation history that increases with decreasing redshift (on average, the SFRs of individual galaxies rise with time). The measured scatter in the SFR-stellar mass relation is tight for galaxies with  $\log M_{\star}/M_{\odot} > 9$  dex. We find that the true intrinsic scatter in the SFR at fixed stellar mass is even small,  $\sigma(\log \text{SFR}/M_{\odot} \text{ yr}^{-1}) < 0.2 - 0.3$  dex. Assuming that the SFR is tied to the net gas inflow rate ( $\text{SFR} \sim \dot{M}_{\text{gas}}$ ), it follows that the scatter in the gas inflow rate is also smaller than  $0.2 - 0.3$  dex for star-forming galaxies in these stellar mass and redshift ranges, at least when averaged over the timescale of star-formation.