X10a Analysis of the SFR–M relation for CANDELS GOODS-S data

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The majority of star-forming galaxies follow a relatively tight relation between stellar mass and star formation rate (SFR) in a wide range of redshifts. This is known as the star-forming galaxy main sequence (SFMS). However, because of the difference in the estimation of SFR, sample selection, and adopted statistical method, the relation has not been quantitatively well determined.

In this work, we made an extensive analysis of the SFMS based on the CANDELS GOODS-S multi-wavelength photometric catalogue (Guo et al. 2013) with 17 wavebands from ultraviolet to mid-infrared wavelengths. We used the `LePhare` code (Ilbert et al. 2006) to obtain the photometric redshifts and the stellar mass of each galaxy. As mentioned, one of the largest uncertainty is the SFR estimation. We first adopted a commonly used method from the rest-frame UV continuum flux corrected for dust extinction according to the Calzetti et al. (2000) reddening law. We also used the GOODS-*Herschel* (Elbaz et al. 2011) catalogue to estimate the obscured SFR by dust. We then obtained the total SFR by combining the obscured SFR and UV-based SFR without dust extinction correction. For this analysis, we examined five different methods to obtain the total IR luminosity. Another source of uncertainty is the statistical method to determine the log-linear slope of the SFMS, as well as to classify galaxy populations on the SFR–M_* plane. We adopted the Gaussian mixture model to the data plane, and inferred the number of subclasses on the SFR–M_* and obained the accurate slope of the relation at different redshifts. In this talk, we present these results.