X02a Galaxy SED Fitting using Nonparametric Star Formation History Model

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Spectral energy distribution (SED) modeling is a powerful tool for deriving stellar masses of galaxies. However, recent studies suggest the inferred stellar masses are sensitive to assumption of star formation history (SFH). We report results of implementing the nonparametric SFH model (Leja et al. 2019) in CIGALE SED fitting code (Boquien et al. 2019) and tests of the model. Tests using mock observations show that input SFHs are reasonably well recovered by using a fixed parameter grid which is common in traditional SED fitting codes. The inferred stellar masses are systematically lower than the true values due to underestimation of the contribution from oldest stars in the posterior. To study the missing stellar mass problem, especially in dusty star-forming galaxies, we fit catalog of 90 EAGLE mock galaxies (Camps et al. 2018) with 850μm flux$>$ 1mJy, $z > 0.5$ and median SFR=$71 M_{\odot}\mathrm{yr}^{-1}$ and pixel-by-pixel photometric catalog at 0.3 arcsec resolution of 9 ALMA 1.2 mm-selected galaxies with median SFR=$288 M_{\odot}\mathrm{yr}^{-1}$ in the ASAGAO survey. The underestimation of stellar mass are on average 0.43dex for EAGLE mock galaxies and 0.11dex for ASAGAO galaxies, and the relation between specific star formation rate (sSFR) and missing stellar mass is similar to Sorba et al. 2018 results of galaxies detected in Hubble eXtreme Deep Field. With current results we are unable to determine the sSFR-missing mass relation of dusty star-forming galaxies due to lack of high resolution mid-infrared data.