Star-forming galaxy properties at $z \sim 4$ and impact of nebular emission: applying lesson from ~ 2

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Abstract

While main optical and near-IR emission lines are not yet observable at high redshift ($z > 3$), it has been recently shown that nebular emission could affect physical parameter derivation of distant galaxies.

We use a sample of 149 spectroscopically-confirmed UV-selected galaxies at $z \sim 2$ to investigate the relative dust attenuation of the UV continua and the nebular emission in these galaxies. For each galaxy of the sample, at least one optical (rest-frame) emission line has been measured and 41 galaxies have additional observations with Spitzer/MIPS at 24μm. We are able to reproduce all the observed quantities for galaxies with no or little extinction, while for attenuated galaxies we need to apply an extra amount of dust attenuation toward nebular emission in comparison with stellar attenuation. We also find a tight correlation between star formation rate and the amount of extra attenuation which can explain the discrepant results about difference in attenuation between nebular and stellar emission at $z \sim 2$.

Finally, assuming that nebular emission has the same properties (dust attenuation) at $z \sim 4$ than $z \sim 2$, we update the estimation of the impact of nebular emission at $z \sim 4$ using the latest CANDELS data with a large spectroscopic sample (N$\sim$ 200).