Z102a Numerical simulations of multi–wavelength radiative properties of galaxies in the epoch of reionization

Shohei Arata (Osaka), Hidenobu Yajima (Tsukuba), Kentaro Nagamine (Osaka)

Recent observations have successfully detected UV, dust continuum, and metal emission lines from galaxies at the epoch of reionization. The multi–wavelength observations showed the wide varieties in the radiative properties of *first galaxies*, but the origin of the variety has not been understood yet. Combining cosmological hydrodynamic simulations and radiative transfer calculations, we study galaxy evolution and radiative properties at $z = 6 - 15$. We find following things: (1) Star formation of the first galaxies occurs intermittently due to supernovae feedback. Escape fraction of UV photons fluctuates between $\sim 0.2 - 0.8$ with the intermittent star formation. (2) In star–burst phases, galaxies are dust–obscured and becomes bright in sub–millimetre wavelength. (3) The luminosity ratio of [O III] to [C II] decreases as galaxies evolve and metallicity increases. The O/C abundance ratio is initially dominated by oxygen enrichment of Type-II SNe, and decreases due to carbon–rich winds from AGB stars, resulting in the decline of $L_{[\mathrm{O\,III}]}/L_{[\mathrm{C\,II}]}$ ratio. Thus, we suggest that synergy with ALMA and Subaru observations will allow us to reveal star formation and feedback processes in first galaxies.