The Role of Dust in the Early Universe: The nature of cosmological reionization sources

D. Yamasawa, A. Habe, K. Omukai, T. Kozasa, T. Nozawa

Motivation:
We focus on the evolution of dust mass and size distribution. We explore the SFE and the IMF transition from Pop III to Pop II stars for various DM halo masses and redshifts in the early universe (z>5).

Method:
We construct a semi-analytic model.

(i) the formation and size evolution of dust by SNe
(ii) the time-dependent chemical reaction networks including $H_2$ formation both on the surface of the dust grains and in the gas phase
(iii) the gas cooling and heating
(iv) the star formation rate which is proportional to $H_2$ mass
(v) DM halo evolution due to the hierarchical merger tree
(vi) the IMF transition from Pop III to Pop II due to dust cooling