

Cosmic Cartography 2022: Exploring the Cosmic Web and Large-Scale Structure



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Star formation and chemical evolution in protocluster

The protocluster's (PC's) are the densest region in the early universe, and many of them have recently been discovered. In high-density regions, galaxy formation is faster and star formation is more active than in the low-density environment. Therefore, PC is important for understanding both the evolution of galaxies and the cosmic star formation history in the Universe. We study the PC's star formation and gas metallicity evolution at $z \sim 2-10$ using the cosmological SPH simulation code GADGET3-Osaka. The total star formation rate in the PC reaches $>3000 M_{\text{sun}} \text{ yr}^{-1}$ at $z=3$, with the core region accounting for about half of the star formation in the PC at $z \sim 2$. For the chemical abundance evolution, we find that the effect of Type II supernova (SN) appears at $z > 3$, while that of Type Ia SN appear at $z \sim 3$ in the core. We also compare the chemical abundance of the gas in individual PC galaxies with observations.

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