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Claudia Di Cesare

(Sapienza, Università di Roma / Institute of Science and Technology Austria)

The gas and dust cycle in high- z galaxies

Investigating the evolution of high-redshift galaxies is a crucial field of research in modern astronomy. In fact, distant galaxies offer us a glimpse back into the cosmic history of our Universe, allowing us to study the early stages of structure formation and evolution. In this talk, I present the intricate landscape of high-redshift galaxy evolution, focusing on the physical properties of $z > 4$ galaxies and their interaction with the surrounding environment. During the last decades, our understanding of the primordial Universe has been revolutionized thanks to technological advancements and the availability of advanced instrumentation such as HST, ALMA, and, more recently, JWST. In particular, the combination of multi-band observations from the above facilities has provided us with a more comprehensive picture of the evolution of high-redshift galaxies, not only allowing us to study in detail their physical integrated properties, but also their star formation and interaction with the surrounding environment. In fact, galaxies can be considered as complex ecosystems whose evolution is governed by interplay of physical mechanisms involving both their Interstellar and Circumgalactic Media. On the other hand, models and simulations are of paramount importance to lead our interpretation of the observations from telescopes. In fact, cosmological simulations play a pivotal role in helping us understating galaxy evolution and the properties of our Universe at different epochs. During the talk, I employ both observations and simulations, highlighting their interplay in exploring and interpreting the primordial Universe.

Serdecznie zapraszam,
Michael Romano, on behalf of the SOC