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Session: Extragalactic Astrophysics and Astrophysics

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Coauthors: No coauthors were included.
Type: Oral
Title: The dynamics of high-redshift star-forming galaxies, driven by disk instabilities
Abstract:

The redshift two Universe ist one of the most interesting epochs of galaxy evolution. It is the era with the peak of the cosmic star formation rate. Between redshift 3 and 1 the total stellar mass density in galaxies increased from 15% to 70%. It is also the time of rapid galaxy assembly and the epoch where galaxy morphology was determined. I will summarize recent observations of the SINS survey, a Spectroscopic Imaging survey of z=2 galaxies in the near infrared with the ESO SINFONI spectrograph. This survey has opened a fascinating window into early galaxy evolution. The SINS data show a diversity of galactic systems at redshift 2 with physical properties that are unparalleled in the z=0 Universe. Gas-rich, extended, fast rotating and highly turbulent disks have been found with star formation rates that are a factor of 10 to 100 larger than in present-day Milky-Way type galaxies. Kpc-sized, massive gas clumps dominate the appearance of these galaxies. These giant clumps are considered to represent the progenitors of present-day globular clusters. They could provide the seeds for supermassive black holes and they might lead to the formation of young bulges in the centers of their galaxies. These fascinating and puzzling observations will be confronted with theoretical ideas and numerical simulations of gas-rich galactic disk evolution. I will argue that the high-redshift galaxies like present-day disks, are in a self-organized equilibrium state with their observed extreme properties emerging naturally from self-regulated galactic evolution, controlled by gas inflow from the cosmic web and regulated by gravitational disk instability and stellar feedback.