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The Quest for Understanding Star-Formation and Galaxy Growth with JWST

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Nearly a year ago, the most expensive space telescope ever built was launched into space. After traveling for 6 months, it began to explore the infra-red universe in June. In 4 months, JWST's extraordinary spatial resolution already allowed groundbreaking discoveries in the field of galaxy formation and evolution. From the first detection of extremely old galaxies (back when the universe was just a few hundred million years old), to the demonstration that the Hubble Sequence was settled much earlier than previously thought and the revelation of dust attenuated star-forming regions, the JWST forces us to rethink the history of galaxies. In my research, I use the JWST images to study the dustiest star forming galaxies as they were 10 billion years ago (aka 'cosmic noon'). Using JWST resolution, I was able to study the gradient of star formation rates and dust attenuation across each galaxy. The main findings are that every galaxy has a compact dusty star forming core, with an accretion-fed disk around it. The disk is usually showing a dust gradient, sign of a perturbed history. Some disks are even quiescent, they don't form new stars. It appears that an important fraction of galaxies grows lopsided accretion-fed disks that at some point trigger a nuclear starburst (probably torque-induced) and finally get devoid of gas in the outskirts. This work demonstrates the major impact JWST will have on the understanding of galaxy mass growth at cosmic noon.

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