

## 7th China-Chile Bilateral Conference for Astronomy



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### A 13-Gyr view of galaxy growth and baryon cycle with JWST 3D Spectroscopy

*Friday, January 9, 2026 2:00 PM (15 minutes)*

Using state-of-the-art reduction methods, we analyze the new JWST data acquired by the NIRISS/NIRCam wide-field slitless spectroscopy (WFSS) and NIRSpec in the multi-object slit-stepping spectroscopy mode. These complementary spectroscopic data sets obtained from multiple instruments open up key window on unbiased investigation of star formation, feedback, and ISM properties in and beyond the cosmic noon epoch. We bring forth the first spatially resolved analysis of high-redshift galaxies with JWST WFSS and measure the first gas-phase metallicity radial gradient with sub-kpc resolution at  $z \geq 3$ . We extend such analysis to galaxies in the epoch of reionization, finding a swift mode transition of galaxy mass assembly and chemical enrichment in the early Universe. We invent a novel methodology of conducting 3D spectroscopy of galaxies by stepping the NIRSpec slits across their surfaces, obtaining resolved chemical and dynamical properties for a sample of 26 galaxies at  $z \sim 1$ . We find clear evidence for strong rotational support in galaxies showing negative metallicity gradients, consistent with the predictions by the FIRE-2 cosmological zoom-in hydrodynamic simulations.

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