

“Inside the Whirlpool Galaxy: Unveiling the Interstellar Medium with JWST”

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Understanding how stars form from the gas and dust in galaxies, and how young stars reshape their surroundings, is key to understanding how galaxies evolve. The James Webb Space Telescope (JWST) is now transforming our view of these processes by unveiling dust, molecules, and embedded star formation that are difficult to study at visible wavelengths. Nearby galaxies provide ideal laboratories for understanding the environments in which stars form. In this talk, I will discuss how multiwavelength observations of nearby galaxies allow us to study the lifecycle of gas, dust, and stars. I will focus on the Whirlpool Galaxy (M51), nearby, nearly face-on galaxy with a wide range of ISM environments. Building on its long history as a benchmark for star formation studies, the JWST Whirlpool Galaxy Treasury program provides an unprecedented view of M51's dusty and molecular ISM. Together, these observations deliver a multi-phase view of M51's ISM: capturing dust, embedded star formation, warm molecular gas, and ionized gas kinematics. I will also showcase the 3600 Å to 28 μm spectral view of HII regions in the galaxy, highlighting massive star signatures (Wolf-Rayet features, supernova remnants), dust extinction, and ionized gas diagnostics. These observations probe the role of early stellar feedback in regulating star formation. The M51 Treasury survey offers a uniquely detailed, multi-phase view of the ISM to directly probe the fundamental physics that regulates star formation, gas, and dust in galaxies.

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