

Dust Production from Metal-Poor AGB Stars: JWST Results from Sextans A

Thursday, 13 June 2024 15:30 (20 minutes)

Dust formed through the winds from stars on the Asymptotic Giant Branch (AGB) can have a substantial contribution to the overall dust budget in a galaxy. However, it is uncertain how metallicity impacts AGB dust production because model predictions vary and observational constraints are scarce at low metallicity. Quantifying the dust production from very metal poor AGB stars has profound implications for identifying the dominant dust producers in the early universe. We present new JWST imaging and spectroscopy of Sextans A, a distant member of the Local Group with 7% Solar metallicity. With NIRCam and MIRI photometry, we identify AGB stars and classify them as oxygen- or carbon-rich. We then fit their mid-infrared SEDs to calculate their dust production rates (DPR) and compare those rates to AGB stars in the Magellanic Clouds and other nearby galaxies. Mid-infrared spectroscopy of five carbon-rich stars reveals they are embedded in carbon-rich dust shells, confirming the previous photometric identification of dusty carbon stars in this very metal-poor environment. One of the sources shows a tentative detection of SiC dust emission at $11.3 \mu\text{m}$. The origin of this SiC dust in Sextans A is a mystery that has strong implications for the dust production and mineralogy in nearby and high redshift metal-poor systems.

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Session Classification: Seeds and grains: AGB stars as dust factories in galaxies