

Q23a Overview of WR DustERS: a JWST program of colliding wind Wolf-Rayet binaries

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Dust is a key ingredient in the formation of stars and planets. However, the dominant channels of dust production throughout cosmic time are still unclear. With its unprecedented sensitivity and spatial resolution in the mid-IR, the James Webb Space Telescope (JWST) is the ideal platform to address this issue by investigating the dust abundance, composition, and production rates of various dusty sources. In particular, colliding-wind Wolf-Rayet (WR) binaries are efficient dust producers in the local Universe, and likely existed in the earliest galaxies.

Here we describe an Early Release Science program DustERS (17.5 hours program in total). We will observe the colliding-wind binaries WR 140 and WR 137 with JWST to investigate dust composition, abundance, and dust formation mechanisms in this process. We will utilize three key JWST observing modes with the medium-resolution spectrometer (MRS) and imager on the Mid-Infrared Instrument (MIRI) and the Aperture Masking Interferometry (AMI) mode with the Near Infrared Imager and Slitless Spectrograph (NIRISS).

Our proposed observations will yield high impact scientific results on the dust forming properties in WR binaries, and establish a benchmark for key observing modes for imaging bright sources with faint extended emission. We are committed to designing and delivering science-enabling products for the JWST community that address technical issues such as bright source artifacts that will limit the maximum achievable image contrast.