Aromatics in Merging Galaxies Involving Active Galactic Nuclei and Starburst Cores as Probed by the James Webb Space Telescope

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The merging of galaxies presents a dynamic laboratory for studying the interplay of molecular species within evolving cosmic environments. In this presentation, we delve into aromatic molecules amidst the tumultuous process of galactic mergers, particularly those involving active galactic nuclei (AGN) and starburst cores, with special attention paid to VV 114, NGC 3256 and J0749+3256. Leveraging the cutting-edge capabilities of the James Webb Space Telescope (JWST), particularly its Mid-Infrared Instrument (MIRI) and Near-Infrared Spectrograph (NIRSpec) equipped with Integral Field Unit (IFU) capabilities, we unravel the chemical intricacies within these cosmic collisions. The emission of polycyclic aromatic hydrocarbon (PAH) molecules, which is clearly seen in the JWST/NIRSpec and MIRI data of galaxy mergers, offers a nuanced lens into the physical conditions within merging galaxies. Due to the sensitivity of the PAH emission bands to PAH size and charge as well as the aliphatic fraction of the molecules, the JWST/NIRSpec and MIRI spectra of merging galaxies allow us to probe the unique environmental characteristics of the regions responsible for the emission. We derive the spatial distribution of the size and charge and chemical structure of the PAH molecules present within these stellar laboratories (VV 114, NGC 3256, and J0749+2255) and discuss the implications.