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PAH Intensity Mapping with SPHEREx and PRIMA

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Polycyclic aromatic hydrocarbons (PAHs) produce some of the most prominent emission features in the infrared spectra of galaxies. PAHs play a crucial role in the thermal balance and chemistry of the ISM and serve as a good tracers of star formation activity and dust abundance. Ongoing and planned upcoming missions such as SPHEREx and PRIMA will enable the study of multiple PAH features in galaxies across cosmic time. An intensity mapping approach offers a powerful means to probe the aggregate PAH emission from all galaxies, providing complementary information to individual source detection. However, since PAH features are broad spectral structures that can be resolved across multiple spectral channels in a typical LIM observation, the standard LIM formalism must be adapted for PAH intensity mapping. In this work, we develop a framework that fully accounts for the spectral convolution between PAH features and observed filters in the intensity mapping context. Using this framework, we forecast the sensitivity of SPHEREx and PRIMA in detecting PAH intensity as a function of redshift.

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