

SPIRIT and SPECS: Science Capabilities and Mission Concepts

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Space-based far IR/submillimeter interferometry is needed to learn how stars and planetary systems form and to answer fundamental questions concerning the development of structure in the universe. I will describe concepts for the Space Infrared Interferometric Telescope (SPIRIT) and the Submillimeter Probe of the Evolution of Cosmic Structure (SPECS). Both are imaging and spectral Michelson interferometers operating in the wavelength range $\sim 40\text{--}800\ \mu\text{m}$. SPIRIT, which could be launched in a decade, is built on a deployable boom and has a maximum baseline of $\sim 30\text{--}50\ \text{m}$, providing sub-arcsecond resolution in the far-IR. This NASA Origins Probe candidate will image extrasolar debris disks and protostars in the far-IR, where their brightness peaks, and it will beat extragalactic source confusion and provide the continuum and line spectra of galaxies out to high redshifts. SPECS, a NASA Vision Mission, uses formation flying to attain baseline lengths up to 1 km, and thus angular resolution comparable to that of the Hubble Space Telescope (HST), the James Webb Space Telescope (JWST), and the Atacama Large Millimeter Array (ALMA). SPIRIT and SPECS will provide access to many important cooling and diagnostic spectral lines and to the bulk of the thermal emission from dust, and make observations complementary to those obtainable with ALMA, SAFIR, and JWST.