

The Space Infrared Interferometry Trailblazer (SPIRIT)

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Abstract

SPIRIT is a concept for a space-based, far infrared, direct-detection interferometer. Cryogenic optics, background limited detectors, and angular resolution comparable to that of a 40 meter aperture would give SPIRIT a spectacular combination of sensitivity and angular resolution from 40 to 400 microns. Multiple, cold, membrane mirrors would be arrayed along a deployable, rotating boom giving SPIRIT good u-v coverage and the ability to make high-dynamic range synthesis images.

In addition, SPIRIT would operate in a long-stroke Michelson beam combination mode to enable simultaneous imaging over a field size of at least 9 sub-aperture diffraction spots with spectral resolution of order 1000. An on-demand spectral resolving element would further increase spectral resolution to of order $1e5$ for specific science objectives and for maintaining background limited operation when observing bright objects.

A primary science goal for SPIRIT would be probing the structure of the early Universe; SPIRIT could directly address grand challenge questions regarding the role of star formation in galaxy evolution.

In addition, SPIRIT would provide a powerful tool for studying the local ISM and the star formation process. SPIRIT would be part of

NASA's complement of space based interferometers such as SIM, TPF, SPECS.

Keywords: farIR, direct-detection interferometers