
Orbiting Astronomical Satellite for Investigating Stellar Systems (OASIS): following the water trail from the interstellar medium to oceans

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Abstract

Orbiting Astronomical Satellite for Investigating Stellar Systems (OASIS) is a space-based, MIDEX-class mission concept that employs a ~14-meter diameter inflatable aperture with cryogenic heterodyne receivers, enabling high sensitivity and high spectral resolution (resolving power $> 10^6$) observations at terahertz frequencies. OASIS science is targeting submillimeter and far-infrared transitions of H₂O and its isotopologues, as well as deuterated molecular hydrogen (HD) and other molecular species from 660 to 81 μm (4 bands in the 455-3690 GHz domain). OASIS will have ~20x the collecting area and ~4x the angular resolution of Herschel, and it complements the shorter wavelength capabilities of the James Webb Space Telescope.

OASIS will have the sensitivity to follow the water trail from galaxies to oceans, as well as directly measure gas mass in a wide variety of astrophysical objects from observations of the ground-state HD line.

OASIS will operate in a Sun-Earth L1 halo orbit that enables observations of large numbers of galaxies, protoplanetary systems, and solar system objects (giant planets, icy moons, comets) during the course of its 1-year baseline mission.

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