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INTERSTELLAR PROBES: THE BENEFITS TO ASTRONOMY AND ASTROPHYSICS

Abstract

Long range observations by the field of astronomy has opened up our understanding of the Solar System, the Galaxy and the wider Universe. In this talk we discuss the idea of direct in-situ reconnaissance of nearby stellar systems, using robotic probes. In particular, we consider what additional knowledge can be learned that can only be obtained by such close encounters. This may include calibration of existing measurements, detailed observations of stellar winds, astrometry measurements of stellar parallax, refinement of our understanding of physics through the use of long baseline interferometers. In addition, getting close to an exoplanet will enable detailed knowledge of planetary interiors, surface processes, geological evolution, atmospheric composition and climate, internal seismology, detailed surface morphology and even the speculative possibility of detecting the presence of microbial life, detailed palaeontology or even indigenous life-forms. We argue that astronomical remote sensing should be pursued in parallel with in-situ reconnaissance missions by robotic probes, so that both can enhance the discoveries and performance of the other. This work is in support of Project Starshot, an effort to send a Gram-scale probe towards another star at 0.2c within the next two decades, and return images and other data to the Earth.