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Author: Prof. Zhuoxi Huo
China Academy of Aerospace Science and Innovation, China, huozx@139.com

MULTIPLE-SPACECRAFT EXOPLANET APERTURE SYNTHETIC INTERFEROMETER (MEAYIN) MISSION CONCEPT AND SCIENCE DRIVERS

Abstract

The MEAYIN (abbr. of Multiple-spacecraft Exoplanet Aperture sYnthetic INterferometer) is a proposed space astronomy mission in China, which consists of several unit telescopes deployed around the Sun-Earth L2 point in order to form a next-generation space observatory in shape of distributed space-borne optical interferometer with equivalent diffraction-limit angular resolution around 0.01 arcsecond in mid-infrared band. Nearby habitable exoplanets as well as potential biosignatures will be detected, confirmed, and characterized with scientific instruments onboard this observatory. Solar system bodies including icy moons, comets and asteroids will be investigated with both imaging and spectral survey so that distribution of water as well as other volatiles in the Solar system will be illustrated. High resolution interferometric imaging and high precision interferometric astrometry will contribute also to mainstream objects of astrophysics such as protoplanetary discs, black holes etc. This mission is led by China Aerospace Science and Technology Corporation (CASC) since 2017. With joint effort contributed from its partners including universities, academics and institutes all over the country, significant progresses in observation methods, optical interferometry, precision formation-fly and other aspects have been established. A solid consortium has been formed with both the academia and the industry. In this article the mission concept and science drivers of MEAYIN is introduced. The scientific requirements including the system of observables regarding habitable exoplanets is presented, which reflect both activities of host stars and the compositions and structures of the habitable exoplanets candidates. Potential scientific yields in other themes such as solar system survey and astrophysics are also reported with numerical simulations. Future work on space borne optical interferometry related techniques development as well as in-orbit demonstration are suggested.