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THE STUDIO UV PHOTOMETRIC BALLOON MISSION AND THE PATH TOWARDS A LARGE APERTURE FAR INFRARED BALLOON OBSERVATORY

Abstract

Observations that require large physical instrument dimensions and/or a considerable amount of cryogens, as it is for example the case for high spatial resolution far infrared astronomy, currently still face technological limits for their execution from space. The high cost and finality of space missions furthermore call for a very low risk approach and entail long development times. For certain spectral regions, prominently including the mid to far infrared as well as parts of the ultraviolet (UV), stratospheric balloons offer a flexible and affordable complement to space telescopes, with short development times and comparably good observing conditions. The European Stratospheric Balloon Observatory (ESBO) initiative aims at profiting from this opportunity to help fill the upcoming gap in mid- to far-infrared observational capabilities with a large-aperture balloon-based observatory. The pathway towards this community-accessible observatory includes the STUDIO (Stratospheric UV Demonstrator of an Imaging Observatory) photometric UV prototype platform and mission. In this paper, we report on the status and first on-ground test results of the STUDIO payload. We furthermore describe the science goals and planned observations with the UV microchannel plate instrument for the 2022 test flight. Future science opportunities on STUDIO with a focus on galactic and solar system astronomy will be outlined. Moreover, we present the further steps foreseen towards a regularly operating balloon-based observatory as the results of the ESBO Design Study as well as advances in technology studies to enable the large-aperture far infrared observatory.