

# Millimetron Space Observatory – Large-Aperture and Cooled Space Telescope

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**Abstract**— Millimetron Space Observatory (MSO) is the next generation space instrument based on 10-meter deployable telescope designed for cryogenic (< 10K) operation at Lagrangian L2 orbit, which decrease all sources of thermal emission from the telescope and atmosphere. It is planned that MSO will cover an extremely wide wavelengths band of from about 50 $\mu$ m up to 20mm. Despite that the ground instruments, e.g., ALMA, has got the big collecting area and angular resolution, MSO will have a great potential for covering the far-infrared band which cannot be matched by any ground, balloon or airborne observatory. Uniqueness of studies in the far infrared range are driven by the fact that the earliest stages of star formation, during the time when gas and dust clouds are collapsing and planets forming can only be observed in it. Another MSO science goal are the compact objects in the Universe, such as the black holes and its surroundings, pulsars and gamma-ray bursts. It's requiring from instrument sub-microarcsecond angular resolution that can be realized only by using Space-Earth interferometry technic at millimeter or submillimeter wavelength ranges. The suite of the state of the art instruments on-board, like a bolometer cameras, imaging spectrometers and heterodyne instruments will provide MSO an unprecedented imaging, spectroscopy and high-resolution spectroscopy capability at the same time as an extremely high angular resolution. We will provide an overview and a current progress in the development of MSO.