

Millimetron Space Observatory as a Scientific Instrument with Excellent Astronomical Capabilities

A. V. Smirnov*, Thijs de Graauw, N.S. Kardashev, T.A. Kosmovich, S. F. Likhachev, S.V. Pilipenko,
D.E. Radchenko

Astro Space Center, Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia

* Contact: asmirn@asc.rssi.ru

Millimetron Space Observatory (MSO) is the next generation space instrument based on 10-meter cryogenically cooled deployable telescope which will be placed at Lagrangian L2 orbit of the Earth-Sun system. Cooling down of the entrance optics to temperatures below 10K with passive and active cooling systems will considerably reduce of magnitude the thermal background emission and thus will provide an unparalleled achievement in the sensitivity. FIR camera, imaging spectrometers and heterodyne instrument will provide high-resolution imaging and spectroscopy and allow investigating the coldest objects in the Universe, the chemical composition and physical properties of gas in the different objects ranging from protoplanetary discs to galaxies at different epochs and many others. Using MSO as an element of Space-Earth Very Large Baseline Interferometer will provide an unprecedented sub-microarcsecond angular resolution which is necessary to study the most compact objects in the Universe, such as the surroundings of black holes, pulsars and gamma-ray bursts. The MSO is proposed as a Russian-led mission with an extensive international consortium. We will show that pioneering instrument -MSO, with present technology, is feasible as a new scientific instrument with excellent astronomical capabilities. We will present an overview and progress in the development of the payload module.