

## Millimetron Space Observatory

A. Smirnov<sup>1\*</sup>, Th. de Graauw<sup>1</sup>, A. Baryshev<sup>2</sup>, P. de Bernardis<sup>3</sup>, S. Likhachev<sup>1</sup>, E. Golubev<sup>1</sup>,  
S. Pilipenko<sup>1</sup>, T. Kosmovich<sup>1</sup> and N. Kardashev<sup>1</sup> on behalf of Millimetron team

<sup>1</sup> *Astro Space Center of P.N. Lebedev Physical Institute, 117997, Moscow, Russian Federation*

<sup>2</sup> *Kapteyn Astronomical Institute, University of Groningen, 9747 AD, Groningen, The Netherlands*

<sup>3</sup> *Sapienza University of Rome, 00185, Roma, Italy*

\*Contact: [asmirn@asc.rssi.ru](mailto:asmirn@asc.rssi.ru)

**Abstract**— The Millimetron Space Observatory (MSO) is to be the next space observatory for the FIR and Submm wavelength range. The observatory is based on a 10-m cryogenically cooled telescope, to be deployed in orbit after having arrived at a L2 orbit of the Earth-Sun system. MSO will be launched at ambient temperatures and cooled down in orbit through a combination of effective passive and active cooling using onboard mechanical coolers. This combination will cool the telescope to temperatures less than 10K as a goal. The latter and aperture size provides an unparalleled achievement in terms the sensitivity of the astronomical instrument. FIR camera, imaging spectrometers and heterodyne instrument on-board of MSO will provide high-resolution imaging and spectroscopy and allow investigating the coldest objects in the Universe – star forming regions, molecular clouds, dust in our and distant galaxies, outer parts of protoplanetary disks, etc. Moreover the observatory will operate not only as a single aperture telescope enabling high-resolution imaging and spectroscopy but also as an element of Space-Earth Very Large Baseline Interferometer (SVLBI). MSO as an element of Space-Earth VLBI will provide an unprecedented sub-microarcsecond angular resolution which is necessary to study the most compact objects in the Universe - supermassive black holes, jets, etc. The MSO is a new scientific instrument with breakthrough astronomical capabilities. We will present a status and progress in the development of the payload module.