Contribution ID: **1015** Type: **Invited talk in the parallel session**

Imaging of M87 and Sgr A* with the Millimetron Space Observatory.

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Making a high resolution image of a supermassive black hole shadow is a direct method to verify the theory of general relativity at extreme gravity conditions. Very Long Baseline Interferometry (VLBI) observations at millimeter/sub-millimeter wavelengths can provide just provide angular resolution sufficient to start resolving supermassive black holes, located in Sgr A*and M87. Recent VLBI observations of M87 with the Event Horizon Telescope (EHT) has demonstrated such capability. The maximum obtainable spatial resolution of ground based VLBI is limited by Earth diameter and by atmospheric transmission and phase variations at the short wavelengths. In order to improve on space resolution a much larger Space-Earth baselines are required. In the cm wavelengths this has been successfully demonstrated by Radioastron Space mission. Millimetron is a next space mission with VLBI capabilities that operates at mm/submm wavelengths. It will have a cooled 10m diameter main dish. The base orbit of Millimetron will be located near the Anti-solar Lagrangian point - L2. In the later phase Millimetron can be pushed on to elongated elliptical orbit to optimize VLBI U-V coverage. We report simulation results of imaging capabilities of Space Earth VLBI consisting of Millimetron and EHT. We used General-relativistic magneto dynamic models (GRMHD) for back holes environment of Sgr A* and M87 for dynamic and static imaging simulations. The impact of atmospheric phase fluctuations is evaluated. ETH-Millimetron observation will significantly improve spatial resolution for static images both from L2 and elliptical orbits. A short integration time snapshot images of Sgr A* from elliptical orbit may allow studying dynamical behavior at smaller timescales.

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