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Imaging and parameter estimation of supermassive black holes with the Event Horizon Imager Space VLBI concept

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The Event Horizon Telescope (EHT) has imaged the shadow of the supermassive black hole in M87 and aims to image the Galactic Center black hole Sagittarius A (*Sgr A*) as well. As a ground-based VLBI array, the resolution of the current EHT is limited by the size of the Earth and the maximum attainable observing frequency, which is set by the severity of tropospheric corruptions beyond millimeter wavelengths. The Event Horizon Imager is a Space VLBI mission concept consisting of two or three satellites in Medium Earth Orbits at slightly different radii. This setup results in a dense isotropic uv-coverage, with a nominal array resolution of 4 μ as at an observing frequency of 690 GHz (this is 23 μ as for the current EHT at 230 GHz), and hence excellent imaging capabilities. In this talk, I will give an overview of the EHI concept and show its black hole imaging and parameter estimation potential, based on realistically simulated VLBI data from general relativistic magnetohydrodynamics (GRMHD) source models. Our simulations show that the EHI could put constraints on the black hole spin and measure the photon ring size to sub-percent precision, allowing for precise tests of general relativity and the Kerr metric.

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