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Simulating Observations of M87 with the Event Horizon Telescope and Space VLBI[1] CATHERINE PETRETTI, Villanova University. Dept. of Astrophysics and Planetary Science, VINCENT FISH, KAZUNORI AKIYAMA, Massachusetts Institute of Technology, Haystack Observatory — The Event Horizon Telescope (EHT), composed of many sub-millimeter radio telescopes across the globe, uses Very-Long-Baseline Interferometry to act as a telescope the size of the Earth. In 2019, the EHT released the first image of a black hole, the super massive black hole at the center of M87. Such images have the potential to provide insight on highly distorted areas of space-time, the perfect environment to test General Relativity and to study the astrophysics of jet formation. However, the EHT's angular resolution of $\sim 20\ \mu as$ does not provide enough detail to resolve important features such as radiative outbursts surrounding the accretion disk, nor to measure the shape and position of the photon ring at physically interesting levels. Here we simulate observations of general relativistic magnetohydrodynamic models of the Kerr black hole M87 with the EHT in conjunction with various satellite arrays to demonstrate how the extension of the EHT into Earth orbit will benefit imaging. Arrays consisting of two satellites just above Geosynchronous Earth Orbit yield an angular resolution of $\sim 3\ \mu as$, providing sharper, more faithful images of M87 and demonstrating the ability to produce spatially resolved, time-resolved movies of the jet-launch region.

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