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High Energy Astrophysics and Cosmology from Space: NASA's Physics of the Cosmos Program

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We summarize currently-funded NASA activities in high energy astrophysics and cosmology embodied in the NASA Physics of the Cosmos program, including updates on technology development and mission studies. The portfolio includes participation in a space mission to measure gravitational waves from a variety of astrophysical sources, including binary black holes, throughout most of cosmic history, and in another to map the evolution of black hole accretion by means of the accompanying X-ray emission. These missions are envisioned as collaborations with the European Space Agency's Large 3 (L3) and Athena programs, respectively. It also features definition of a large, NASA-led X-ray Observatory capable of tracing the surprisingly rapid growth of supermassive black holes during the first billion years of cosmic history. The program also includes the study of cosmic rays and high-energy gamma-ray photons resulting from range of physical processes, and efforts to characterize both the physics of inflation associated with the birth of the universe and the nature of the dark energy that dominates its mass-energy content today. Finally, we describe the activities of the Physics of the Cosmos Program Analysis Group, which serves as a forum for community analysis and input to NASA.