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High Energy Astrophysics and Cosmology from Space

ANN HORNSCHEMEIER, NASA GSFC

While much can be learned from physics experiments on and astronomical observations from the ground, certain questions require space-based investigations. Sometimes the scale of the measurement, such as the baseline of approximately 10^6 km necessary for the observation of gravitational waves in the frequency range expected for high-redshift supermassive black hole mergers, causes us to leave behind the limitations of the earth. From space we measure the X-ray emission from the final stages of accretion onto black holes and critical energy ranges of cosmic rays and gamma ray photons resulting from particle acceleration in e.g., star forming environments, that otherwise we could not measure due to the atmosphere. Space-borne experiments may also measure all of the cosmological information available in the polarization of the cosmic microwave background to probe the physical conditions that caused the process of inflation in the early universe, moments after the big bang. This presentation will cover the NASA high energy astrophysics and cosmology science portfolio, embodied in its Physics of the Cosmos program, including updates on technology development and programmatic matters.