

High-Energy Astrophysics.



Image credit: NASA/CXC/SAO (X-rays); NASA/STScI (Optical); NASA-JPL-Caltech (Infrared)

High-energy astrophysics (HEA) explores the most energetic phenomena in the Universe, which involve the emission of high-energy electromagnetic radiation (e.g., X-rays and gamma rays). Research subjects include massive star explosions, gamma-ray bursts (GRBs), matter accretion onto compact objects (such as black holes, neutron stars, and white dwarfs) in binary star systems or in galactic centers, non-thermal radiation from astrophysical jets, and more. These phenomena – most of which dynamically unfold

over timescales ranging from seconds to decades – are studied primarily through their electromagnetic radiation, as well as through high-energy particles (e.g., neutrinos and protons) they emit. While the AAM Sections' research group specializes in theoretical HEA, it is essential to note that this field requires an interdisciplinary approach, integrating theoretical calculations and simulations with observations from modern ground-based and space telescopes. Members of the HEA group thus focus on organizing observations and analyzing observational data (time series, spectra, polarization) using advanced statistical methods. Group members actively participate in NASA evaluation panels, international scientific working groups (such as STROBE-X, HEX-P, AXIS), and European scientific mobility programs (IKY-DAAD). They have also contributed to numerous written reports for NASA's scientific programs.

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