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A NICER View: Physics and Astrophysics from the International Space Station

ZAVEN ARZOUMANIAN, NASA

Pursuing insights into fundamental physics beyond the reach of terrestrial (or even Solar System) experiments motivates much observational astronomy. Among NASA's recent efforts in this arena is the Neutron star Interior Composition Explorer (NICER) mission: its key science objective is to probe the physics of matter at the highest stable densities anywhere in the universe, found only in the cores of neutron stars. These objects are also remarkable for their strong gravity (second only to black holes), for anchoring the most powerful magnetic fields known, and for their extraordinary spin rates—a flywheel the size of Washington, D.C., containing up to twice the Sun's mass with a trillion times its magnetic field strength, and rotating several hundred times per second is surely one of nature's most outrageous offerings and host to plenty of unusual physics. Launched in 2017 to the International Space Station (ISS), the NICER payload observes neutron stars and other astrophysical targets in the "soft" X-ray band, at photon energies between 0.2 and 12 keV. I present the NICER mission and its central role in deepening our understanding of the physics governing neutron stars, black holes, and other celestial sources of X-rays.