

The Neutron star Interior Composition Explorer

Keith Gendreau¹, Zaven Arzoumanian^{1,2}, and the NICE Team

¹NASA/GSFC, Greenbelt, MD USA

²USRA, Greenbelt, MD USA

E-mail(KJ): Keith.c.gendreau@nasa.gov

ABSTRACT

The Neutron star Interior Composition Explorer (NICE) will be a Mission of Opportunity dedicated to the study of neutron stars, the only places in the universe where all four fundamental forces of nature are simultaneously in play. NICE will explore the exotic states of matter within neutron stars, revealing their interior and surface compositions through rotation resolved X-ray spectroscopy. Absolute time-referenced data will allow NICE to probe the extreme physical environments associated with neutron stars, leveraging observations across the electromagnetic spectrum to answer decades-old questions about one of the most powerful cosmic accelerators known. Finally, NICE will definitively measure stabilities of pulsars as clocks, with implications for navigation, a pulsar-based timescale, and gravitational-wave detection. NICE will fly on the International Space Station, while GLAST is on orbit and post-RXTE, and will allow for the discovery of new high- energy pulsars and provide continuity in X-ray timing astrophysics.