Opportunity Title: Astrophysics: Stellar X-Ray Astrophysics
Opportunity Reference Code: 0075-NPP-NOV23-GSFC-Astrophys

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0075-NPP-NOV23-GSFC-Astrophys

Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description The Laboratory for High-Energy Astrophysics' astrophysics group has been responsible for several kinds of important instruments on many of the missions that have provided data for most of x-ray astronomy. In addition to those missions for which we provided instruments, the laboratory's HEASARC maintains data bases and expertise for many others. We are guest investigators on Chandra, XMM-Newton, and INTEGRAL. Discoveries using these data have been fundamental in developing our current understanding of such disparate astrophysical systems as compact stars, normal stars, and supernovae remnants, active galactic nuclei; and clusters of galaxies. Our analysis environment is designed with the objective of using complementary data to obtain a consistent picture of different aspects of the sources.

Accreting Binary X-ray Sources. Compact galactic x-ray sources show a wide variety of timing behaviors that are often associated with spectral signatures. Both low- and high-mass systems have characteristic time scales-which are little understood-of high and low state intervals as a result of disk precession or accretion cycles. The RXTE ASM data base provides an unprecedented record of these and there are pointing observations of many of the states exhibited. The PCA instrument on RXTE discovered that the numerous low-mass x-ray binaries are probably all pulsars with rotation periods of 1-3 milliseconds. Thermonuclear flash bursts have on the one hand become the agent for revealing the rotation directly and on the other hand may reveal their detailed physics through the evidence of the pulsations. The dynamical time scales of stellar black hole candidates are revealing signals potentially diagnostic of the geometry and physics in the regions close to the black hole, where gravity is strong. A large public data base is accessible as well as proprietary data and the potential for follow-up observations. Observations with the higher energy resolution (Chandra, XMM, at the moment) will greatly extend our ability to unravel the location and the state of the x-ray emission regions.

Normal Stars. The Einstein Observatory discoveries that most types of nuclear burning stars have x-ray luminosities far exceeding that of our Sun were followed by all sky and individual deep observations at low-energy resolution with ROSAT and EXOSAT. ASCA has obtained time tagged moderate spectral resolution data from late and early type stars. RXTE has looked for flares and eclipses in its energy band (above 2 keV). The observation of the occultation of hard x rays in Eta Carina is a notable success. Analysis of observations of RS CVn stars could clarify the evidence that sometimes the corona is extended and sometimes confined to a low scale height. The question of the metal abundance remains a problem which Chandra and XMM observations should help resolve.

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Location:
Goddard Space Flight Center
Greenbelt, Maryland

Field of Science: Astrophysics

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Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: https://www.nasa.gov/oiir/export-control.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.