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Analysis of Archived X-Ray Observations of a Galactic X-Ray Binary

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Poster Presentation 25

ANALYSIS OF ARCHIVED X-RAY OBSERVATIONS
OF A GALACTIC X-RAY BINARY

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The low mass X-ray binary, a neutron star-normal star system, 4U 0614+09 is identified with a faint blue optical counterpart. It is located in the galactic plane at a distance of 4 kpc and is known to be an X-ray burster, emitting X-rays at a constant low level interspersed with occasional powerful bursts. The X-ray source 4U 0614+09 has a higher than average metallicity relative to other low mass X-ray binaries. Spectroscopic X-ray observations from the Advanced Satellite for Cosmology and Astrophysics (ASCA) were obtained from NASA archives. ASCA was launched by Japan on February 20, 1993, and is still operational today. Observations of 4U 0614+09 were carried out early in 1993 during the performance verification (PV) phase of the instrument. The detectors carried by ASCA, two CCD cameras called the Solid-state Imaging Spectrometers (SIS) and two Gas Imaging Spectrometers (GIS), both have excellent energy and spatial resolution. The data collected from 4U 0614+09 are of varying quality and have never been published. In order to probe some of the physical properties and geometric information of the X-ray emitting gas, a spectroscopic analysis of the best PV phase data was performed. The continuum was fit using an X-ray spectral fitting package called XSPEC. Discrete line features of the spectrum were identified to determine which ion species are present in the source. Two models of heating mechanisms, collisional and photoionization, were then tested to investigate the temperature, density, and geometry of the line-emitting gas.