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X-Ray Emission from Accreting White Dwarfs

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Cataclysmic variables (CVs; interacting binaries in which a white dwarf accretes matter from a Roche-lobe filling donor on or near the main sequence) and symbiotic stars (white dwarf-red giant binaries) are excellent laboratories in which to study accretion physics, without having to worry about relativistic effects. Their fluxes are high enough to enable detailed X-ray and multiwavelength observations, due to a combination of moderately high luminosities (up to about 10^{34} erg s^{-1} or so) and short distances (many CVs are within 200 pc of the Earth). CVs and symbiotic stars can also be powered by nuclear burning, often in the form of nova eruptions. Here I will present several topics in which significant advances have been made in recent years. First, hard X-ray surveys with INTEGRAL and Swift/BAT have discovered a large number of magnetic CVs (as predicted) and a handful of symbiotic stars (a major surprise). Second, X-ray reflection has been established as a powerful tool for the study of accretion onto white dwarfs thanks to the high energy sensitivity of NuSTAR. Third, Fermi/LAT has detected more than a dozen novae in eruption as transient GeV gamma-ray sources, and we have begun to detect them concurrently as highly absorbed X-ray sources. Finally, there are several notable puzzles to do with the physics of accretion disks: why the low state disks in CVs still allows siginificant accretion onto the white dwarf, why hard X-ray emission remains when the boundary layer turns optically thick, and at what accretion rate this transition happens. Such questions should be addressed with the behaviors of X-ray binaries in mind, to probe the similarity and differences of the accretion disks based on the nature of the compact objects.

Topic

Affiliation

NASA/GSFC and UMBC

Primary author: MUKAI, Koji (NASA/GSFC and UMBC)

Presenter: MUKAI, Koji (NASA/GSFC and UMBC)

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