



Poster A26

Hard X-ray and Optical Activity of Intermediate Polars

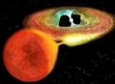
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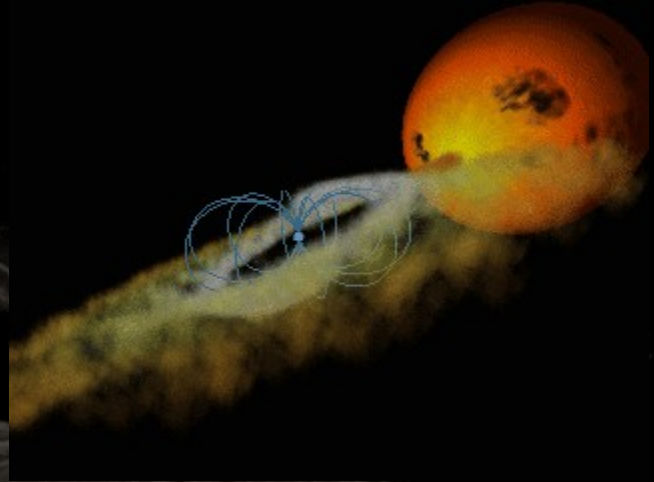
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IAU Symposium 282, From Interacting Binaries to Exoplanets: Essential Modeling Tools, Tatranská Lomnica, Slovakia, July 18 - 22, 2011

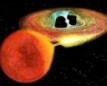
Cataclysmic variables



- Cataclysmic variables (CVs) manifest strong activity in the whole spectrum from radio up to gamma rays.
- CVs are close binary systems of a hot white dwarf (WD) and red MS star, which fills the volume of its inner Roche lobe and transfers matter to the vicinity of the WD.
- According to strength of WD magnetic field this matter is creating an accretion disk (*classical CVs*) or follows magnetic lines and falls to surface of the WD (*polars* and *intermediate polars* (IPs)).
- In IPs, the WD magnetic field ($10^6 - 10^7$ G) is not strong enough to disrupt disc entirely and simply truncates the inner part of disc.
- When this material impacts to the WD atmosphere, a shock will form and hard X-ray emission will result from thermal bremsstrahlung cooling by free electrons in the hot post-shock region with $kT \sim 10$ s of keV.

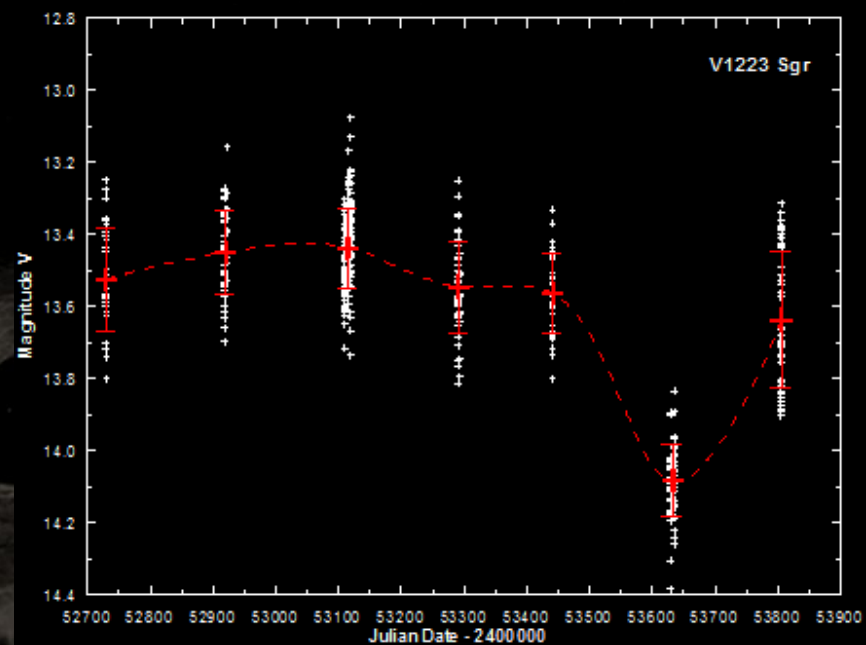
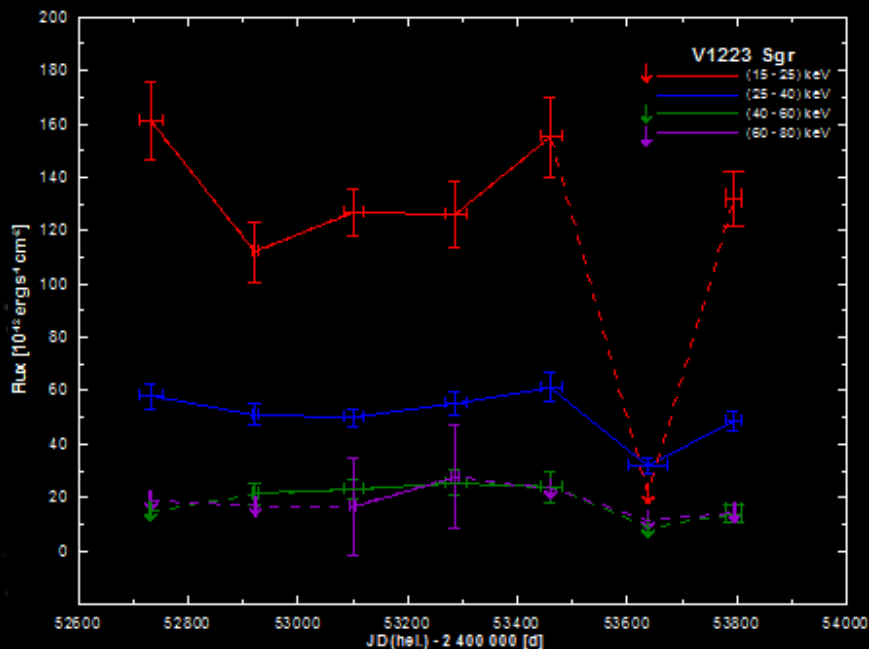
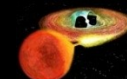


X-ray ray variability



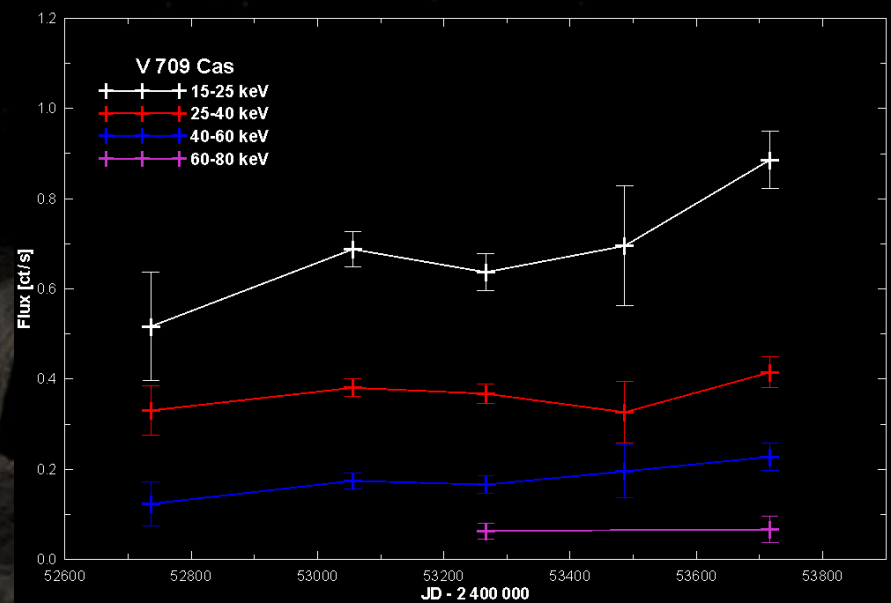
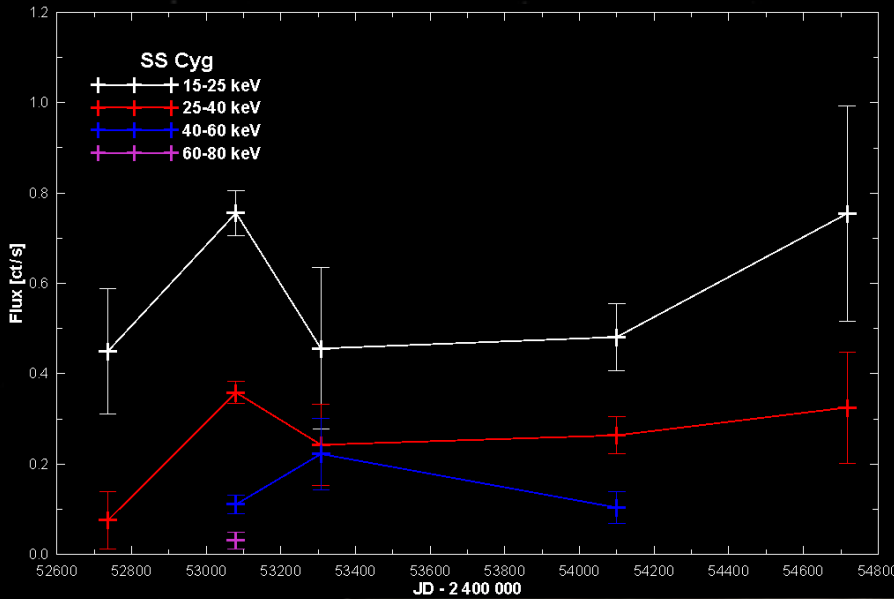
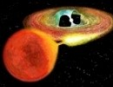
- ④ In total, 32 CVs (and 2 symbiotic systems) were detected (more than expected, 5% of all *INTEGRAL* detections).
- ④ Nevertheless, this sample represent only 25% of all known IPs.
- ④ Some IPs are not detectable even we have significant exposure time (more than 4Msec) for these sources.
- ④ This fact can be related to activity state of these close interacting binaries.
- ④ We used all available observational data from *INTEGRAL/IBIS* and *INTEGRAL/OMC* detectors to study possible variability of selected IPs in X-ray and optical, respectively.

Intermediate polar V1223 Sgr



- The fluxes especially in (15 - 25) keV and (25 - 40) keV bands are long-term variable with significant drop (low state) around MJD \sim 53 650.
- Optical variations are correlated with the changes in (15 - 25) keV, (25 - 40) keV and (40 - 60) keV spectral bands with correlation coefficient 0. 81, 0. 82 and 0.89, respectively.
- Strong correlation suggests, that variations in optical and X- ray are related to the same physical process – the decrease in mass transfer between components.

Intermediate polars: SS Cyg, V709 Cas



- ⦿ Variability in X-rays (up to 60 KeV) is common among IPs and is related to the mass transfer between components of these systems.
- ⦿ Simultaneous observation from optical up to X-ray allow to track the transferred matter from donor, through accretion disk, to the surface of WD.
- ⦿ Photometrical campaign to obtain long-term homogenous observations (to cover whole activity cycles) as well as sets of observation with high time resolution (to detail cover of orbital cycles) of selected CVs.