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UV AND X-RAY IMAGING OF INTERACTING BINARY SYSTEMS

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Multi-wavelength studies of many currently unresolved interacting binary systems have detected dramatic changes in the spectral distribution of the emission related to changes in accretion processes. These studies demonstrate that there are many aspects of accretion processes in general, and of wind accretion processes in particular, that are not yet understood. The key to further accretion studies is resolving a wide range of interacting binaries and studying their components and mass flows. I discuss current and future prospects for resolving a wide range of interacting binary systems.

Currently, most of our observational studies of accretion are based on time-resolved spectroscopy. Although spectroscopy has provided valuable information, very few interacting systems have been spatially resolved so far. Observations of the nearby symbiotic system Mira AB carried out over the past 20 years demonstrate the power of multi-wavelengths sub-arcsecond angular resolution imaging. (e.g. Karovska et al., 1997; Karovska et al., 2005 and references therein; Matthews and Karovska, 2006). Mira AB is the only interacting binary for which the components have been resolved from X-ray to Radio wavelengths using modern ground- and space-based observatories.

The results from these long term observations show that multi-wavelengths high spatial and spectral resolution imaging, and especially at UV and X-ray wavelengths, offers unprecedented opportunities for detailed studies of the components and the accretion processes in interacting binary systems, including imaging of mass flow between the components (Fig. 1).

Increasing the resolution to *sub-milliarcsecond* level in the UV and X-rays will revolutionize the observational astrophysics of the 21st century and provide unprecedented opportunities for studies of many interacting binaries. To achieve this, large baselines, from 0.5 to many kilometers will be required. Several future missions providing ultra-high angular resolution at UV and X-ray wavelengths are currently under study.

Future space observatories like the Stellar Imager (Carpenter et al., 2004), a 0.5 km baseline multi-mirror imaging interferometer operating in the UV/Optical, will provide a resolution of *less then 0.1 milliarcsecond*. This will be an increase of over 2 magnitudes when compared to the current resolution power of the HST and Chandra.

The Stellar Imagers will be able to resolve a large fraction of interacting binaries ranging from CVs to Symbiotics, and many other fascinating interacting systems in the Universe (Karovska et al., 2004).

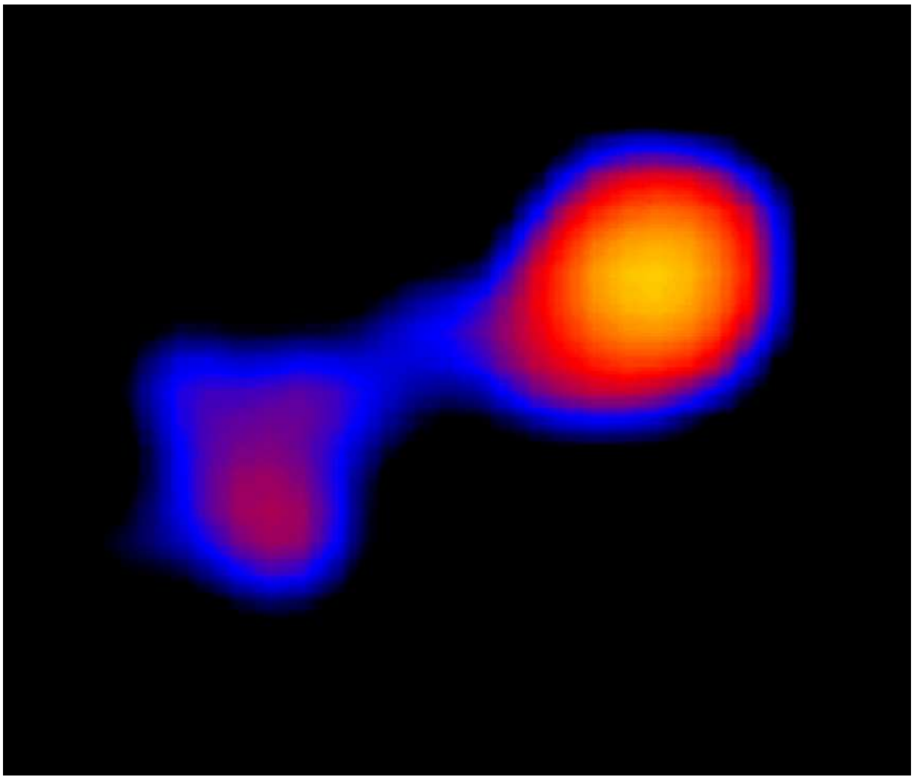

Figure 1: Chandra deconvolved image of Mira B (left) and Mira A (right), separated by ~ 0.6", showing a bridge between the components. The Mira A image shows an elongation to the NW associated with a powerful outburst.

References

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