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Multi-wavelength observations of High Mass X-ray Binaries

Most High Mass X-ray Binaries (HMXB) host a neutron star accreting from the intense stellar wind of a massive star. They have been revealed by a wealth of multi-wavelength observations, from X-ray to infrared domain. I will review here what these observations have brought to light about our knowledge of HMXB, and which part of HMXB still remains mysterious.

Intensive programs, including imaging, photometry, low and high resolution spectroscopy, stellar spectra modeling, spectral energy distribution (SED) fitting, timing and interferometry, have shown that properties of HMXB are mainly dictated by the nature of their massive host stars. Imaging and photometry allow us to identify various types of HMXB; Low and high resolution spectroscopy, combined to stellar spectra modeling, lead us to derive accurate parameters of the companion star (interstellar absorption, metallicity, rotation, gravity, etc); SED fitting gives us information on intrinsic absorption and characteristics of circumstellar enveloppe; Mid-infrared imaging allows us to explore the impact of these active stars on their environment; Timing brings us orbital and spin periods; and finally interferometry opens the way to directly imaging the dust cocoon surrounding HMXB...

The INTEGRAL satellite has launched the revival of HMXB studies, extending the population of supergiant HMXB (from only 5 in 1986 to nearly 35 today), revealing previously unknown highly obscured and transient HMXB (so-called supergiant Fast X-ray Transients, SFXT). The first detections of gravitational waves has boosted the interest of studying compact binaries hosting massive stars, obscured HMXB being candidate precursors of binary systems entering the common enveloppe phase.
Many questions are still pending, related to the accretion processes, the wind properties in these massive and active stars, and the overall evolution due to transfer of mass and angular momentum between the companion star and the compact object. We will see how future observations should be able to answer to these questions, which put together, constitute the mysterious part of HMXB.

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