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# Chemical abundances in High-mass X-ray binaries

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## Abstract

In recent years, gravitational waves (GWs) have been detected from various sources, including black hole (BH) and neutron star (NS) mergers, posing new challenges to our understanding of massive stellar evolution. Although numerous population synthesis models have been presented to explain these events, their results depend on many parameters subject to significant uncertainties. Several aspects of binary interaction, particularly the consequences of mass transfer on the accretor, remain major challenges, with observational data on massive stars in the Milky Way and its satellites often conflicting with the parameters required to produce GW progenitors.

Massive X-ray binaries (MXRBs) serve as important test-benches for understanding the impact of mass accretion on massive main-sequence stars. Supergiant X-ray binaries (SGXRBs) offer valuable insights, as they may allow the derivation of metal abundances, despite being rapid rotators. These abundances can test the effect of accretion and fast rotation on the envelopes of stars, thus providing constraints on their future evolution towards a second supernova explosion. High-quality, high-resolution spectra are crucial for such studies, but the faintness of most of these objects represents a challenge. Advances in instrumentation offer promising new avenues for research.

Here we present the analyses of GTC/MEGARA spectra of the optical counterparts of four such SGXRBs. Stellar parameters were derived by using the Astro+ tool and compared to previous estimates. Additionally, we studied the chemical abundances in the spectra with higher S/N. The preliminary results suggest that the surface chemical compositions may be significantly different from those of fast-rotating stars evolving in isolation.

My poster in zenodo.org can be found here