N12a 3D Dynamic Models of X-ray Emission from Massive-star Binaries

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Colliding wind binaries (CWBs) are unique laboratories for X-ray astrophysics. The two massive stars contained in these systems have powerful radiatively driven stellar winds, and the conversion of their kinetic energy to heat (up to 10^8 K) at the wind-wind collision region generates thermal X-rays (up to 10 keV). Rich data sets exist of several multi-year-period systems, as well as key observations of shorter period systems, and detailed models are required to disentangle their phase-locked emission and absorption processes. To interpret these X-ray light curves and spectra, we model the wind-wind interaction of CWBs using 3D smoothed particle hydrodynamics (SPH), and solve the 3D formal solution of radiative transfer to synthesize the model X-ray properties, allowing direct comparison with the colliding-wind X-ray spectra observed by, e.g., Chandra, Suzaku, RXTE and XMM. We will present our models of the highly eccentric, long-period systems eta Carinae and WR140, and the 2.67-day-period CWB HD 150136, which contains the nearest O3 star. We will also discuss recent improvements to the models since the Sendai meeting, such as incorporating the CAK line force to accelerate the winds, reformulating the SPH equations using the so-called 'pressure-entropy' formulation, and/or calculating X-ray line profiles to prepare for future mission like Astro-H.