

Breathing Fire: High-speed Ejecta from a Gamma-ray Binary

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If a rotation-powered (non-accreting) pulsar is in a binary with a high-mass star, then the collision of the relativistic pulsar wind with the stellar wind creates an intrabinary shock, generating high-energy radiation. In addition, the shocked pulsar and stellar winds can leave the binary and form a nebula whose properties should vary with the orbital phase. To search for such a nebula, we carried out multiple observations of the well known gamma-ray and X-ray high-mass binary LS 2883 with the Chandra X-ray observatory. In this eccentric binary ($e = 0.87$, $P_{\text{orb}} = 3.4$ yr) a middle-aged pulsar B1259-63 orbits a fast-rotating Be star with an equatorial excretion disk. Our observations have unexpectedly shown X-ray emitting clumps, moving away from the binary in about the same direction and changing their shape and brightness. Presumably ejected near periastron passages, they reached projected velocities of about $0.1 c$. I will discuss possible explanations of this remarkable phenomenon whose nature has not been fully understood yet.

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