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Radiation from stellar bow shocks

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Early-type OB stars are hot and have strong radiation fields that accelerate supersonic winds that can reach velocities of a few thousands of km/s. Most of these stars are part of binary systems, and some are kicked away from their orbits by a supernova explosion of their companion or because of tidal gravitational disruptions. The ejected star is denominated runaway and has typical supersonic velocities of tens of km/s or more. A subclass of runaway stars called hypervelocity-stars can reach velocities of thousands of km/s. Winds of runaway stars interact with their surrounding media injecting energy and generating an arc-shaped structure called a bow shock, which consist of two shock waves: a forward shock that propagates through the interstellar medium and a reverse shock that propagates through the stellar wind. Shocked interstellar gas and dust are heated and compressed, producing thermal free-free emission. Electrons and protons can also be accelerated up to relativistic energies in the reverse shock through diffusive acceleration mechanisms, and can then interact with local electromagnetic and matter fields emitting broadband non-thermal radiation. In this talk, I will address the main features of massive stars and stellar bow shocks. Additionally, I will present predictions about non-thermal radiation in the bow shocks of hyper-velocity stars and preliminary results about radiation at radio wavelengths in the bow shocks of some detected runaway stars.

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