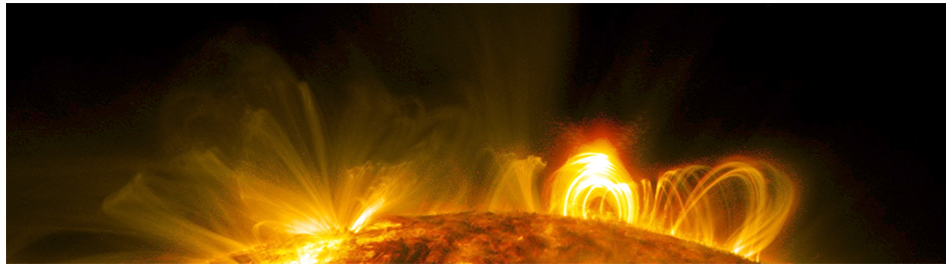


Particle Acceleration in Solar Flares and the Plasma Universe – Deciphering its features under magnetic reconnection



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Particle Acceleration in Massive Stellar Binary Systems

Monday, November 15, 2021 11:30 AM (30 minutes)

The majority of massive stars form a binary system with another massive star. Their strong winds with velocities at $1000\text{-}3000\text{ km s}^{-1}$ collide between the two stars and produce stationary shocks. Several so-called colliding wind binary systems (CWBs) within a few kpc from the Sun produce shock-heated plasmas at $\sim 3\text{-}5 \times 10^7\text{ K}$ and emit luminous X-rays up to $\sim 10^{34\text{-}35}\text{ ergs s}^{-1}$. The shock should also accelerate a small number of particles to relativistic energies via the Fermi mechanism. In the 2010s, the NuSTAR and Fermi observatories with excellent sensitivities in the extremely hard X-rays ($>10\text{ keV}$) or GeV gamma-rays detected signatures of the accelerated, non-thermal particles from eta Carinae, a supermassive star with the strongest colliding wind activity in our Galaxy. The spectra suggest at least two components, perhaps originating from pion-decay radiation or inverse-Compton radiation of stellar UV radiation upscattered by the accelerated particles. I introduce the current understanding of particle acceleration in massive CWBs.

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