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Particle acceleration and radiation in stellar clusters

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The search of Galactic sources able to accelerate cosmic rays (CR) up to energies of ~PeV (the so-called PeVatrons) is one of the most active research topic in the field of high energy Astrophysics. For decades supernova remnants have been considered the most promising candidates but deep gamma-ray observations and theoretical developments suggest that such sources are unable to produce PeV CRs at the required flux. Young massive stellar clusters (YSC) may represent an interesting alternative. In fact several YSC are associated with gamma-ray sources and, at least in one case (the Cygnus cocoon), photons up to 1.4 PeV have been detected by LHAASO, suggesting the presence of hadrons beyond PeV energies. I will present a theoretical model based on diffusive shock acceleration at stellar winds which can account for the gamma-ray emission from YSC.

Summary

Primary author: MORLINO, Giovanni (INAF/Oss. Astrofisico di Arcetri)

Presenter: MORLINO, Giovanni (INAF/Oss. Astrofisico di Arcetri)

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