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The effect of spatially dependent diffusion coefficient on particle acceleration at the wind termination shock of a star cluster

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The wind termination shock of compact star clusters has been recently proposed as a potential site of cosmic ray acceleration. The most recent observation of gamma-ray emission up to a few PeV from Cygnus OB2 by LHAASO indicates that particles can be accelerated up to > 1 PeV in the environment of this star cluster. In this work, we study how a spatially varying diffusion coefficient downstream of the termination shock affects the maximum energy of accelerated particles. For three different turbulent cascades, the particle energy spectrum and their spatial distribution, together with the hadronic gamma-ray emission, are calculated. We find that a spatially dependent Bohm diffusion is favored to explain the LHAASO data but other interpretations are being explored.

Collaboration(s)

Authors: LI, Ben (Gran Sasso Science Institute); Prof. BLASI, Pasquale (Gran Sasso Science Institute); AMATO, Elena

Presenter: LI, Ben (Gran Sasso Science Institute)

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