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Tens PeV neutron or several TeV gamma jets may be feeding disconnected and aligned far TeV gamma beam

The understanding of micro-quasars is one of the frontiers of high energy astrophysics. Their models are based on a capturing mass by compact objects, Neutron star (NS) or in general Black Hole (BH), with a nearby spiraling binary companion star. The companion star mass usually feeds an accretion disk around the NS or the BH. The in-falling mass also fuels a precessing X and gamma jets, orthogonal to the disk. The spiral tail of such micro-quasars jets, as the SS433 system, is ruled by an ultra-relativistic jet, spraying nucleons and electrons at relativistic speeds. The up-down twin jet is observable in radio, X and gamma spectra by almost half a century. Its long spirals tails are spread and diluted within a light-year distance. The SS433 source is well inside the W50 supernova remnant nebula, whose tiny asymmetry reflects the past and present role of the jet. Very recently HESS, HAWC discovered, surprisingly, at a much far disconnected distance, away from the SS433 inner jet, the resurgence of a far twin hard gamma beam track. At a distance of nearly 75 years light far away from the same inner SS433 source. A recent model is trying to explain this nature, based on an accelerating shock wave which re-accelerates at PeV energies nuclei beam and their TeV secondary traces. The re-collimation of this PeV-TeV beam jet is difficult to be accepted, in view of the planar-like Fermi shock wave geometry. We considered an alternative model based on known high energy nuclear physics. Namely on tens PeVs proton jet converted by photon pion scattering, within a past hot nova flare, into a tens PeV neutron beam shoot. This neutron jet is capable, by its decay in flight, to simultaneously re-bright in such a far disconnected distances by tens TeV electron secondaries, whose resurgence and alignment fit the observed Inverse Compton TeV gamma jet. A quite similar process might be originated also by the photo-disintegration of light nuclei. In a different, fine tuned alternative model we considered also the eventual presence around the W50 nebula, a mass shell clouds where the external gamma beam is originated: such a target might act as a beam dump scattering for several tens TeV photons ejected in a past SS433 highest jet event. These photon scattering on nuclei may led to their splitting and to radiation by their electron pairs beams: they may finally shine tens TeV gamma by ICS in the disconnected and observed beam space. Several future observation by HAWC, HESS and LHAASO might be able to disentangle, validate or reject each of the two models.

Collaboration(s)

ROME UNIVERSITY, NAPLE INAF

Author: Prof. FARGION, Daniele (Physics Department, Rome University 1, Sapienza, ; Osservatorio Astronomico di Capodimonte, INAF, Italy,)

Co-authors: Prof. KHLOPOV, Maxim (National Research Nuclear University MEPhI (RU)); DE SANCTIS LUCENTINI, Pier Giorgio

Presenter: DE SANCTIS LUCENTINI, Pier Giorgio

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