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Probing the age of 3C58 via multiwavelength observations

Abstract content

The Northern sky pulsar wind nebula 3C58 has been regarded as the remnant of the SN1181, although radio expansion rate and optical filaments velocity measurements suggest a larger age for this nebula. We present two approaches for solving the transport equation of particles in a convective wind. On the one hand, a 2D evolution modeling employs the proper boundary conditions to explain the measured radio velocity, the synchrotron nebular emission in terms of photon index vs radius, synchrotron surface brightness and terminating energy dependent size, as well as the inverse Compton γ-ray flux. With this procedure we derive a nebular field strength around 10 μG, which is well below the equipartition value of 80 μG, with the strongest argument in favour of such a weak field strength coming from a constraint on the cooling of the highest energy electrons from the pulsar wind shock to allow X-ray emitting electrons to survive to the edge of the pulsar wind nebula. The SED distribution fails in reproduce the radio data. To overcome this problem, a 1D time-dependent modeling is introduced, which successfully reproduces the SED distribution. We predict the inverse Compton γ-ray flux from 3C58 as a function of the system age, which according to this time-dependent model, can be used by GLAST and ground-based VHE gamma-ray observations in the northern hemisphere, such as MAGIC and VERITAS, to shed light on the age problem.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

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