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HESS J1632-478: an energetic relic

HESS J1632-478 is an extended and unidentified TeV source in the Galactic plane.

In order to identify the source of the very high energy emission and to constrain its spectral energy distribution, we used a deep observation of the field obtained with XMM-Newton together with data from Molonglo, Spitzer and Fermi to detect counterparts at other wavelengths. The flux density emitted by HESS J1632-478 peaks at very high energies and is more than 20 times weaker at all other wavelengths probed. The source spectrum features two large prominent bumps with the synchrotron emission peaking in the ultraviolet and the external inverse Compton emission peaking in the TeV.

HESS J1632-478 is an energetic pulsar wind nebula with an age of the order of 10^4 year.

Its bolometric (mostly GeV-TeV) luminosity reaches 10% of the current pulsar spin down power.

The synchrotron nebula has a size of ~ 1 pc and contains an unresolved point like X-ray source, probably the pulsar with its wind termination shock.

As of today, we only know about one hundred of Galactic sources emitting in the TeV band. A large part of them still do not show a firm association and are thus classified as unidentified. Different simulations have shown that CTA, with its better angular resolution and deeper sensitivity, will significantly enrich the current scarce TeV source population, detecting up to 400 new Galactic sources during its Galactic Plane Survey (GPS). With such a larger statistics, is not even excluded that a new sub-class of sources could be detected among supernova remnants, pulsar or pulsar wind nebulae. Let the future surprise us.

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