

Constraining leptonic emission scenarios for the PeVatron candidate HESS J1702-420 with deep XMM-Newton observations

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The unidentified TeV source HESS J1702-420 has recently been proposed as a new hadronic PeVatron candidate, based on the discovery of a small-scale emission sub-region with extremely hard gamma-ray spectrum up to 100 TeV (named HESS J1702-420A). Given the difficulty to discriminate between a hadronic or leptonic origin of the TeV emission, based on the H.E.S.S. measurement alone, we opted for a multi-wavelength approach. A deep X-ray observation was carried out using the XMM-Newton satellite, with the goal of probing a possible association with a hidden leptonic accelerator. No evidence of a clear counterpart for HESS J1702-420A was found in the X-ray data. After excluding an association with all nearby X-ray point sources, we derived a strict upper limit on the average magnetic field in the HESS J1702-420A region, which significantly strengthens its classification as a hadronic PeVatron candidate. We additionally report the serendipitous discovery of a new possibly extended X-ray source, whose association with HESS J1702-420A is deemed unlikely but cannot be completely ruled out.

Primary author: GIUNTI, Luca

Co-authors: Dr KHELIFI, Bruno (APC Paris); Dr ACERO, Fabio (AIM, CEA, CNRS, Université Paris-Saclay); Dr KOSACK, Karl; Prof. TERRIER, Regis (APC Paris)

Presenter: GIUNTI, Luca

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