



Contribution ID: 600

Type: **Poster contribution**

Exploring the potential X-ray counterpart of the puzzling TeV gamma-ray source HESS J1507-622 with new Suzaku observations

Saturday 1 August 2015 15:30 (1 hour)

The unidentified very high energy (VHE, $E > 100$ GeV) gamma-ray source HESS J1507-622 seems to not fit into standard models for sources related to young supernova remnants, pulsar wind nebulae, or young stellar populations in general. This is due to its intrinsically extended, but yet compact morphology, coupled with a relative large offset (3.5 deg) from the Galactic plane. Therefore, it has been suggested that this object may be the first representative of a new distinct class of extended off-plane gamma-ray sources. The distance to HESS J1507-622 is the key parameter to constrain the source's most important properties, such as age and energetics of the relativistic particle population.

In this paper, we report on results of follow-up observations of the potential X-ray counterpart with Suzaku. We present detailed measurements of its spectral parameters and find a high-absorbing hydrogen column density, compatible with the total amount of Galactic gas in this direction. In comparisons to measurements and models of the Galactic 3D gas distribution, we show that the potential X-ray counterpart of HESS J1507-622 may be located at the far end of the Galaxy. If the gamma-ray source is indeed physically connected to this extended X-ray source, this in turn would place the object outside of the usual distribution of Galactic VHE gamma-ray emitters.

Collaboration

– not specified –

Registration number following "ICRC2015-I/"

527

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Session Classification: Poster 2 GA

Track Classification: GA-EX