2. HESS J1702-420

(1) Properties

• Coordinates: (l, b) = (344°.26, −0°.22)
• Largely extended in the VHE band (15-30 arcmin)
• Spectral index in the VHE band: \( \gamma = 2.1 \)
• Flux (1-10 TeV): \( F_{\text{VHE}} = 3.1 \times 10^{-11} \text{ erg s}^{-1} \text{ cm}^{-2} \)
• No known source exists within 25 arcmin

(2) Suzaku Observation

• Date: 2008/03/25 - 2008/03/30
• Effective exposure: 216 ks

(3) X-ray Image

No plausible counterpart was detected in either energy bands.

(4) X-ray Spectrum

• Assumption: X-rays from HESS J1702-420 is uniformly extended in the XIS FOV.
• Model: (CXB+GRXE) + excess emission
  - CXB (cosmic X-ray background) and GRXE (Galactic ridge X-ray emission) [6] are the typical background on the Galactic plane
  - Excess emission: power-law (\( \Gamma = 2.1 \))
  - The upper limit of the excess flux (2-10 keV) was \( F_X < 2.4 \times 10^{-13} \text{ erg s}^{-1} \text{ cm}^{-2} \) in the 90% confidence range.

(5) Discussion

• If we assume the electron origin, the flux ratio corresponds to the energy density ratio of seed photons and magnetic field.
• The flux ratio of this source: \( F_{\text{VHE}}/F_X > 13 \)

(6) Summary of HESS J1702-420

• No X-ray counterpart was found in Suzaku FOV despite long exposure.
• A tight upper limit of X-ray flux was derived: \( F_X < 2.4 \times 10^{-12} \text{ erg s}^{-1} \text{ cm}^{-2} \).
• This source is a new example of dark particle accelerator.

The origin of the VHE emission is likely not electrons but protons.

3. HESS J1427-608

(1) Properties

• Coordinates: (l, b) = (314°.41, −0°.15)
• Slightly extended in the VHE band (2.4-4.8 arcmin)
• Spectral index in the VHE band: \( \gamma = 2.2 \)
• Flux (1-10 TeV): \( F_{\text{VHE}} = 2.5 \times 10^{-12} \text{ erg s}^{-1} \text{ cm}^{-2} \)
• No known source (including energetic pulsar) exists within 30 arcmin: unlikely PWN candidate

(2) Suzaku Observation

• Date: 2010/01/13 - 2010/01/16
• Effective exposure: 104 ks

(3) X-ray Image

• A possible counterpart was detected in the 2-8 keV band!
• RA: \( \sigma = 1.2 \pm 0.2 \text{ (arcmin)} \)
• Dec: \( \sigma = 1.4 \pm 0.2 \text{ (arcmin)} \)

The source is extended.

(4) X-ray Spectrum

• Background subtracted spectra in the 1.5-8.0 keV are fitted by an absorbed power-law.

(5) Discussion

• Morphology
  - Position coincides with the VHE source
  - Extension: smaller than the VHE source
  - X-rays can be explained by electrons in a magnetic field of B = 3.7 \( \mu \text{G} \), VHE gamma-rays should be produced by electrons.
  - Nature: unknown, but a pulsar wind nebula (PWN) is one of the possibilities

(6) Summary of HESS J1427-608

• We found possible X-ray counterpart to the VHE gamma-ray source.
• The X-ray source is extended to ~1.4 arcmin, which is smaller than VHE source.
• Both X-rays and VHE gamma-rays can be explained by relativistic electrons.

Reference