



Contribution ID: 100

Type: **Parallel Talk**

Where are hadronic PeVatrons? –Constraints and Prospects

Thursday, August 11, 2022 3:50 PM (20 minutes)

The high flux of hadronic cosmic rays and the detection of bright gamma-ray sources suggest a tight connection between them, which implies that Galactic neutrino sources must exist. However, none have been detected. Where are they? We outline constraints on the properties of hadronic PeVatrons based on the existing data. We introduce a new population-based approach, calibrated to the observed cosmic-ray flux and demanding consistency with measurements of gamma-ray sources, diffuse flux, and neutrino non-detection. We make new predictions and discuss the implications of detections or non-detections. We also define the detector requirements to definitively test the origins of the Milky Way's hadronic cosmic-ray sources.

Collaboration name

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Session Classification: Galactic Sources

Track Classification: Cosmic Rays