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Finding strangelets in cosmic rays from HESS J1731-347, a possible strange quark star

The idea that supernova remnants are a significant source of Galactic cosmic rays is supported by the fact that HESS J1731-347 would be one of the few Galactic sources to accelerate hadronic cosmic rays to TeV energy. The radius (4.2-5.5 km) and estimated mass (˜ 0.77 M) are both much less than the usual range for neutron stars. Because of its compactness and short radius, we investigate a different explanation for the low-mass ultra-compact star in this supernova remnant. Our findings support the idea that the compact object in HESS J1731-347 could be a strange quark star rather than a regular neutron star, which produces hadronic cosmic rays when 2SC transforms into the Color-Flavor-Locking (CFL) phase. This strange quark matter star estimates the strangelet flux in cosmic rays, which is important for strangelet detection in planned cosmic ray space studies.

Primary author: DAS, Chitta Ranjan (BLTP, JINR)

Presenter: DAS, Chitta Ranjan (BLTP, JINR)

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