



ID de Contribution: 95

Type: ORAL

A Close Correlation between TA Hotspot UHECR Events and Local Filaments of Galaxies and its Implication

mercredi 10 octobre 2018 17:35 (20 minutes)

The Telescope Array (TA) experiment identified a concentration of ultra-high-energy cosmic ray (UHECR) events on the sky, so-called hotspot. Besides the hotspot, the arrival directions of TA events show another characteristic feature, i.e., a deficit of events toward the Virgo cluster. As an effort to understand the sky distribution of TA events, we investigated the structures of galaxies around the hotspot region in the local universe. We here report a finding that there are filaments of galaxies, connected to the Virgo Cluster, and a correlation of statistical significance between the galaxy filaments and TA events. We then present an astrophysical model to explain the origin of the hotspot and the deficit of TA events.

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Classification de Session: Sessions