

Anisotropy in the TeV Cosmic Rays: A Challenge for Interpretation

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To measure the per-mille anisotropy in the TeV cosmic rays with a ground-based experiment, it is necessary to estimate the exposure of the detector to cosmic ray air showers. The estimate must account for drifts that occur in the detector during the course of the measurement, as well as changes in the shower signal at ground level caused by atmospheric conditions. Due to the difficulty of the exposure calculation, all experiments follow a similar procedure in which the exposure is calculated in small time steps using real events. Using this method, the exposure can be estimated with sufficient accuracy to measure per-mille effects in the data. However, calculating the exposure using the data themselves also introduces significant and surprising artifacts into the resulting sky maps. Using simulated events, we will demonstrate the difficulty of interpreting the cosmic ray anisotropy in light of these artifacts.

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