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The puzzle of cosmic ray muons

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Indications of a discrepancy between simulations and data on the number of muons in cosmic ray showers exist over a large span of investigations. The excess of muon bundles has been observed by the ALICE detector at LHC in its dedicated cosmic ray run (confirming similar findings from the LEP era at CERN) as well as the excess in the muon number in general has been reported by the Pierre Auger Observatory.
We discuss a simple mechanism which can simultaneously increase predicted muon counts for both. Arguing that muonic bundles of highest multiplicity are produced by strangelets, hypothetical stable lumps of strange quark matter infiltrating our universe, we successfully describe data from CERN experiments. Significant evidence for anisotropy of arrival directions of the observed high-multiplicity muonic bundles is found. Estimated directionality suggests their possible extragalactic provenance.
To examine this scenario in the shower development as observed by the Pierre Auger Observatory detailed Monte Carlo simulations had to be carried out. We obtain a rough agreement between the simulations and the data for ordinary nuclei without any contribution of strangelets in primary flux of cosmic rays. Even if the strangelets contribute with small amount in primary flux and generate high multiplicity muon bundles, as we advocate recently, their influence on the average muon content in EAS is negligible.

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