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Search for Anti Quark Nuggets via their interaction with the LHC beam: A reanalysis of stored data from the 4000 LHC monitors [12+3]

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Anti-quark nuggets, AQNs, (ZHITNITSKY, 2003), have been suggested to solve the dark matter (DM) and the missing antimatter problem in the universe, and have been proposed as an explanation of various observations.

Their size is in the μm range and their density equal to the nuclear density with an expected flux of about 1 / km^2 / year. For the typical velocity of DM constituents (~ 250 km/s), the solar system bodies act as highly performing gravitational lenses; Here we assume that DM streams or clusters are impinging, e.g., on the Earth, as was worked out for DM axions and WIMPs.

Interestingly, in the LHC beam, unforeseen beam losses are triggered by so-called UFOs (Unidentified Falling Objects), which are believed to be constituted of dust particles with a size in the μm range and a density several orders of magnitude lower than AQNs.

Prezeau suggested that streaming DM constituents incident on the Earth should result in jet-like structures (“hairs”) exiting the Earth. Such ideas open up novel directions in the search for DM.

This talk suggests a new analysis of the UFO results at the LHC, assuming that they are eventually, at least partly, due to AQNs. Specifically, a reanalysis of the existing data from the ~ 4000 beam monitors since the beginning of the LHC is proposed, arguing that dust and AQNs should behave differently. The feasibility of this idea has been discussed with three CERN accelerator experts and other collaborators.

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