



Contribution ID: 228

Type: **Poster**

Jagjit Singh Sidhu (CASE): Novel Macroscopic Dark Matter (Macro) Detection Schemes

Wednesday 21 February 2018 18:54 (1 minute)

Macroscopic objects made of baryonic matter with sizable strangeness (i.e. many of the valence quarks are strange quarks, rather than the usual up and down quarks found in protons and neutrons) may be stable, and may have formed prior to nucleosynthesis [1][2] thus evading the principal constraint on baryonic dark matter. We have analyzed the expected signals that would be produced from the passage of macroscopic dark matter (macros) through the atmosphere and sedimentary rock. Fluorescence detectors (FD) such as those of Pierre Auger Observatory and JEM-EUSO could detect the light produced from the recombination of the resulting plasma in the atmosphere. This could involve hardware or software changes to the trigger. The tracks of metamorphic rock (fulgurites) that macros would leave in passing through sedimentary rock could be distinguished from the surrounding sedimentary rock. We present the regions of parameter space that could be probed from the expected atmospheric fluorescence and fulgurite tracks.

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Session Classification: Poster Session