

DIMS Experiment for Dark Matter and Interstellar Meteoroid Study

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DIMS (Dark matter and Interstellar Meteoroid Study) is a new experiment aiming to search for macroscopic dark matters and interstellar meteoroids. Nuclearites are nuggets of stable strange quark matter (SQM), neutral in charge and hypothetical super-heavy macroscopic particles (macros), and may be important components of the dark matter in our Universe. Nuclearites of galactic origins would have an expected typical velocity of about 220 km/s in galactic frame, whereas in the case of a head-on collision between interstellar meteoroids with a velocity that exceeds the escape velocity of the solar system and the Earth orbiting the Sun, the geocentric velocities will be larger than 72 km/s. We study the possibility to search for such fast-moving particles by using very high-sensitivity CMOS cameras with a wide field of view.

Based on observational data of meteor events using such stereo camera systems at some locations, we estimate the observable mass ranges for the moving nuclearites and the interstellar meteoroids. Observable flux limits are also estimated for these mass ranges.

We designed the DIMS experiment to search for such particles. In its first stage, the DIMS system consists of 4 high-sensitivity CMOS camera stations with a wide field of view. The system is going to be constructed at the Telescope Array cosmic-ray-experiment site in Utah, USA.

Details of the project science, plans and present status with preliminary test results will be reported in this paper.

Keywords

macroscopic dark matter; nuclearite; strange quark matter; SQM; meteor; meteoroid; interstellar meteoroid

Collaboration

other Collaboration

DIMS

Subcategory

Future projects

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