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The Cosmic Ray Extremely Distributed Observatory (CREDO) [Online]

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The Cosmic Ray Extremely Distributed Observatory (CREDO) is a recently formed, global collaboration dedicated to observing and studying cosmic ray ensembles (CRE): groups of minimum two cosmic rays with common primary interaction vertex or the same mother particle. The CREDO program embraces testing the known CRE scenarios, and getting ready to observe the unexpected physics, it is also suitable for multi-messenger and multi-mission applications. CRE could be formed both within classical models (e.g. as products of photon-photon interactions), and exotic scenarios (e.g. as results of decay of Super Heavy Dark Matter particles and subsequent interactions, Lorentz invariance violation), their fronts might be significantly extended in space and time, and they might include cosmic rays of energies spanning the whole cosmic ray energy spectrum. CRE are expected to be partially observable on Earth even if the initiating interaction or process occurs as far as ˜1 Gpc away, with a footprint composed of at least two extensive air showers with parallel arrival directions and correlated arrival times.
Since CRE are mostly expected to be spread over large areas over hundreds of kilometers or more, and because of the expected wide energy range of the contributing particles, CRE detection might only be feasible when using the available cosmic ray infrastructure collectively, i.e. as a globally extended network of detectors. CREDO is perfectly suited for probing the variation of fundamental constants in the aforementioned physical processes as well as for other applications like the search for signatures of Earthquake precursors within the flux of cosmic rays.

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