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Exploring high-energy cosmic ray scenarios with global CREDO network of detectors

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Among theoretical approaches in unveiling the physics of ultra-high-energy cosmic rays (UHECR) one can distinguish the models assuming interactions of exotic super-heavy matter (including extra dimensions, Lorentz invariance violation, cosmic strings, dark matter particles or particles beyond the standard model etc.) and acceleration scenarios describing processes, in which the particles are accelerated by a particular astrophysical object (shocks in relativistic plasma jets, unipolar induction mechanisms, second-order Fermi acceleration, energy transfer from black holes or compact stars etc.). Special interest is also paid to understanding of the cosmic ray ensembles (CRE) –the phenomena composed of at least two cosmic ray particles, including photons, with a common primary interaction vertex or the same parent particle with correlated arrival directions and arrival times. In this contribution, we review various theoretical UHECR models and CRE scenarios potentially observable by the global network of detectors within the CREDO (Cosmic Ray Extremely Distributed Observatory) Collaboration.

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