

MoEDAL (The Monopole & Exotics Detector at the LHC) and Beyond

Igor Ostrovskiy, Stanford University

The magnetic monopole is a hypothetical particle that was postulated to exist by Dirac to explain the apparent quantization of the electric charge. As was shown by t'Hooft, any Grand Unification Theory (GUT) that incorporates electromagnetism can contain magnetic monopoles. Heavy magnetic monopoles with a mass comparable to the GUT scale could have been produced in the early universe during a symmetry-breaking phase transition. Intermediate mass monopoles (IMM) exist in theories with several stages of symmetry breaking. IMMs would be produced after the inflationary epoch and would not catalyze proton decay. The possibility of even lower mass monopoles can not be excluded theoretically, and searches for direct magnetic monopole production are performed every time a new energy regime becomes experimentally available. In particular, a dedicated magnetic monopole search – MoEDAL – is currently being conducted at the LHC, complementing other general-purpose experiments. This talk describes the motivation, the detectors, and the outlook of the experiment. A particular attention is given to the potential new addition to MoEDAL detectors, the solid state breakdown counters, which could combine threshold properties of nuclear track detectors with electronic registration in real time. Applicability of this detection technology to the future ultra large magnetic monopole searches in cosmic rays is also discussed.