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IceCube Searches for Magnetic Monopoles

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The IceCube Neutrino Observatory, located at the geographic South Pole, is the world's largest neutrino telescope. It instruments one cubic kilometer of ice with more than 5000 optical sensors and is designed to detect the light emitted by particles produced in neutrino-nucleon interactions in the ice.

Magnetic monopoles are hypothetical particles with non-zero magnetic charge, and are predicted to exist in many extensions and unifications of the Standard Model of particle physics. A wide range of masses is allowed for magnetic monopoles, leading to a broad speed range for a hypothetical cosmic flux. A magnetic monopole passing through IceCube would produce light through several different physical processes, where the speed of the monopole determines which one dominates. This light can then be readily detected by IceCube's optical modules.

In this talk I will give an overview of the methods and results of current and recently finished searches for a cosmic flux of magnetic monopoles in IceCube. A focus will be put on the most recent search for magnetic monopoles with speeds above the Cherenkov threshold in ice, where the dominant background consists of the rare and extremely high energy astrophysical neutrinos. A new sensitivity on the cosmic flux of magnetic monopoles will be presented, improving on the previous upper limits by approximately an order of magnitude.

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