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IceCube Searches for Magnetic Monopoles

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The IceCube Neutrino Observatory instruments one cubic kilometer of Antarctic ice with over 5000 optical sensors in order to detect the light produced in neutrino-nucleon interactions in the ice.

Magnetic monopoles are hypothetical particles with non-zero magnetic charge. A wide range of masses is theoretically allowed for magnetic monopoles, leading to a broad allowed speed range for a hypothetical flux of relic monopoles created shortly after the Big Bang. A magnetic monopole traversing IceCube would produce optical light through a variety of different mechanisms that depend on the monopole speed. This light is readily detected by IceCube's optical modules, and the large fiducial volume ensures a high effective area for detection. The different light production mechanisms also result in distinct detection signatures and therefore require different search methods.

To date, IceCube analyses searching for a cosmic flux of relic magnetic monopoles cover a large portion of the allowed magnetic monopole parameter space, and have produced world leading upper limits on the monopole flux. There are currently several ongoing IceCube searches for magnetic monopoles, and in this talk I will report on the new approaches and recent results of these searches.

Summary

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