

Abstract Submitted
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Probing Micro Black Holes and Extra Dimensions through IceCube SULTAN MALIK, Lawrence Berkeley National Laboratory — If extra space dimensions and low-scale gravity exist, Microscopic Black Holes (MBHs) will be produced in collisions of elementary particles. Ultrahigh-energy cosmic neutrinos, also known as GZK neutrinos, provide a promising window on this phenomenon. For GZK neutrinos above $\sim 10^7$ GeV, the MBH production cross section in neutrino-nucleon interactions exceeds the standard model cross section by two or more orders of magnitude increasing the chances of detection by neutrino observatories. The IceCube neutrino observatory, buried 1.4 km under the Antarctic ice near the South Pole, was used to probe production of MBHs in this analysis. One month data from the IceCube detector was searched for events that could be possible MBH events. The expected number of events was also calculated theoretically for both the Standard Model cross section and the MBH model cross section using a standard GZK flux prediction. No significant MBH events were found in the data analysis which is consistent with the low expected number of MBH events. Detecting MBH directly requires large amount of observable data, and so is not an effective method for probing MBHs. Further study is required to come up with indirect ways of detecting MBH production using IceCube.

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