

Abstract Submitted
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Method Development of Detecting PeV Gamma Rays Using the IceCube Observatory MAXIM EGOROV, Lawrence Berkeley National Lab, ICE-CUBE COLLABORATION — We present a method of detecting PeV gamma rays from the Galactic Plane using the IceCube Observatory. IceCube is a cubic km scale Cherenkov ice detector located ~ 1.4 km under the ice at the geographic South Pole, with a sister component IceTop, a surface air shower array, located directly above it. By selecting extensive air shower (EAS) events with a shower axis that passes through both IceTop and IceCube, it is possible to distinguish CR from gamma ray EAS by their muon content. CORSIKA Monte Carlo simulations of both EAS types are used to develop and test the best cuts for gamma ray and CR separation. All muon-rich EAS are eliminated by cutting out events that trigger IceCube, suppressing the background to consists of muon-poor CR EAS, while falsely rejecting $\sim 20\%$ of the gamma ray signal. We improve the method by separating the remaining $\sim 20\%$ of gamma ray signal from the CR background by analyzing three types of cuts: rectangular, Fisher Discriminant, and Multilayer perceptron (MLP). With the emaining $\sim 20\%$ of gamma ray EAS, the MLP cut is found to give the best results yielding 33.6% signal efficiency for 99.997% background rejection. Overall, MLP improves signal efficiency to $\sim 86.6\%$.

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