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A new method for finding point sources in high-energy neutrino data

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The origin of astrophysical neutrinos remains a mystery. The isotropic spacial distribution of the observed events implies that to detect point sources, both order-of-magnitude more statistics and more advanced search tools are needed. Here we introduce a maximum-likelihood method for search of point-like sources using event pairs. We show that when a decent angular resolution is available, this method is capable of reducing the statistical errors significantly comparing to the traditional search method using individual events. We present our progress of applying this method to the IceCube public data. Finally in light of the pair method we predict in general the ability of a future high-energy neutrino detector to identify the first neutrino point sources.

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