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Using event pairs to search for point-like sources in high-energy neutrino data

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The origin of astrophysical neutrinos remains a mystery. The first detections of TeV-PeV neutrinos by the IceCube Observatory found their arrival directions showing no departure from isotropy, implying that to detect point sources, both order-of-magnitude more statistics and more advanced search tools are needed. In this talk we discuss a maximum-likelihood method for search of point-like sources utilizing event pairs. We show that when a decent angular resolution is available, this method is capable of reducing the false positive and negative errors by about 50% comparing to the traditional search method using individual events. We conclude with implications of our method to future neutrino data and experiments.

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