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Improved Methods in Neutrino Astronomy MICHAEL ZAIDEL, Pennsylvania State University, ROB HALLIDAY, MEHR NISA, TYCE DEYOUNG, Michigan State University, ICECUBE COLLABORATION — The evolving field of Neutrino Astronomy has the potential to associate high-energy neutrino detections with point-like sources, thereby identifying astrophysical particle accelerators. Further informing this search with local neutrino flavor ratios allows for greater sensitivity in the identification of astrophysical neutrino sources. Past IceCube Collaboration studies were unable to find statistically significant correlations between neutrino data and point source locations, aside from the notable TXS 0506+056 discovery linking a neutrino to a blazar in 2017 as well as 13±5 additional neutrinos from a 158-day flare in 2015-16. Even though the neutrinos from an astrophysical source are expected to be a mix of all flavors, no satisfactory method for utilizing all flavors in a single search has been found. This project involved the use of a detailed Earth attenuation model to calculate the survival and detection proportions of astrophysical neutrino fluxes. These findings were used to create an Ideal Event Type Ratio, describing the ratio of cascades to tracks - a proxy for the neutrino flavor ratio - as a function of energy. The resulting distribution is useful in generating probability distribution functions for flavor ratio informed neutrino point source searches.

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