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Double Cascades Reconstruction Algorithm in IceCube

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The study of high-energy neutrino events provides a means to probe the nature of numerous phenomena in the universe. This is because neutrinos interact with matter via the weak interaction and gravity. Neutrinos come in different flavors and can oscillate from one flavor to another. Different neutrino interactions with matter produce distinct light topologies, which can be detected by the mDOMs within the IceCube detection volume. The flavor of an incoming neutrino can only be inferred from the topology of the deposited light (track, single cascade, or double cascade). Consequently, IceCube has developed a number of reconstruction algorithms that reconstruct light topologies from the available data according to each algorithm's model. Monopod is dedicated to single cascade reconstruction, while Taupede is designed for double cascades. This has led to the development of classification schemes that determine the type of neutrino using the best-fit values from the corresponding reconstruction algorithm.

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