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Partially-contained samples in the Super-Kamiokande atmospheric neutrino oscillation analyses

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Atmospheric neutrino events observed at the Super-Kamiokande detector are divided into classes based on their topology. In the case of partially-contained events, neutrino interacts within the inner part of the detector, but some of the charged particles produced in this interaction leave the inner region and enter into the outer part of the detector, as opposed to the fully-contained events, for which no such particle escape is observed. This simple difference in topology implies that partially-contained events have bigger energy than the fully-contained ones, and consequently they are produced in different neutrino interactions and are sensitive to different neutrino oscillation parameters. For this reason, partially-contained events are an important part of any atmospheric neutrino analysis. In this talk, I will present the results of a preliminary study aimed at improving the resolution of reconstructed energy of partially-contained events, by identifying particles that leave the outer part of the detector. Since the neutrino oscillation probability explicitly depends on neutrino energy, improved resolution should entail better sensitivity to oscillation parameters in the future atmospheric neutrino analyses.

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