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Track Reconstruction and Characterization in Liquid Scintillator Detectors at High Energies

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Liquid scintillator detectors are well established in the field of neutrino physics (e.g. Borexino, KamLand, JUNO and SNO+). Applications span a wide range from solar neutrino detection over neutrinoless double beta searches to reactor anti-neutrino detection.

Most liquid scintillator experiments have implemented algorithms to track high-energetic events like muons. Past analyses have demonstrated that radioisotope production (C-11, Li-9 or He-8) is strongly correlated with muon-induced showers. To identify these events and to reduce the dead-time of the detector, reliable and precise tracking algorithms are a strong necessity for many analyses.

This talk will summarize recent developments in the field of muon track reconstruction. Focus will be given to two tracking algorithms (”BackTracking” and “topological track reconstruction”). Different to common track reconstruction approaches, the topological track reconstruction is sensitive to the energy loss along the muon track and allows to resolve topological features like showers which lead to an increase in energy deposition. This might then be used for spatial vetoes.

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