

## Position reconstruction for the PandaX-4T experiment

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When incoming particle hits the xenon atoms in the PandaX dual-phase xenon detector, the ionized electrons drift upward and get amplified under electric fields, yielding a secondary scintillation signal (S2). The S2 signal is then collected by PMT arrays at the top of the detector, which keeps the position information of the original scattering event.

In the data analysis, position reconstruction plays an important role in terms of energy resolution and background suppression etc.

In this work we develop three types of position reconstruction algorithms for the PandaX-4T experiment based on 169 PMTs at the top of the detector, including template matching(TM), photon acceptance function(PAF), neutral network(NN).

We use these algorithms to reconstruct S2 signals' horizontal position, and evaluate the corresponding resolution and precision based on the 83mKr calibration data, wall events data, BiPo events data and neutron calibration data during the PandaX-4T detector commissioning.

### Summary

Three types of position reconstruction algorithms for the PandaX-4T experiment: template matching(TM), photon acceptance function(PAF), neutral network(NN).

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