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Enhancing SDD Energy response with ML and differential programming

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We show a novel ML and differentiable programming calibration technique and the gains it yields on the energy response of the Silicon Drift Detectors used in the VIP-2 underground experiment. This technique shows an improvement of 10 eV on the previous state-of-the-art in the VIP collaboration, in terms of Full Width at Half Maximum at 8 keV. The SDD energy resolution is a key observable in the VIP-2 experiment, searching for violations of the Pauli Exclusion Principle in atomic transitions in copper. Finally, we show that this method additionally corrects for miss-calibrations, and requires less fine-tuning with respect to standard methods.

Summary

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