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dE/dx Software in the BESIII Experiment

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The BESIII experiment operates as an electron-positron collider in the tau-charm energy region, pursuing a range of physics goals related to charm, charmonium, light hadron decays, and so on. Among these objectives, achieving accurate particle identification (PID) plays a crucial role, ensuring both high efficiency and low systematic uncertainty. In the BESIII experiment, PID performance heavily relies on two key measurements: the energy deposit per unit length (dE/dx) obtained from the main drift chamber (MDC) sub-detector, and the time of flight (TOF) measurement from the TOF sub-detector.

This contribution focuses specifically on the dE/dx aspect and provides a comprehensive overview of the dE/dx software employed in the BESIII experiment. The presentation encompasses simulation, calibration, and reconstruction techniques implemented in the analysis pipeline. Last but not least, with the help of machine learning (ML) technique, a study of ML-based dE/dx simulation will also be presented.

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