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Data-driven evaluation of the electron identification performance with LHCb 2024 data

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In this work, the performance for the identification of electrons and misidentification of pions as electrons is measured for 2024 LHCb data. The detector and the reconstruction have changed significantly for Run 3, so it is important to validate the electron identification performance with the early data. Electron identification is evaluated by the electron reconstruction algorithms in the trigger system. High-statistics and high-purity calibration samples collected in the calibration stream of the high-level trigger are used to evaluate the electron identification performance using the tag-and-probe method. The decay channel chosen for the evaluation of the ID efficiencies is $B \rightarrow J/\psi(\rightarrow ee)K$, whereas for the misID, the $D^* \rightarrow D^0(\rightarrow K\pi)\pi$ is used. The method to obtain the efficiencies involves a BDT that is trained to efficiently discriminate signal from combinatorial background. Then, a simultaneous fit to the “all” and “pass” samples is performed to obtain the final result.

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