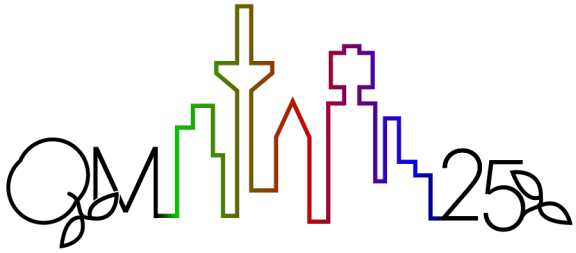

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Studying the exotic hadron X(3872) in pp collisions at \sqrt{s} = 13.6 TeV with ALICE

Exotic hadrons, such as tetraquarks, fall outside the traditional classification of mesons and baryons. Their production mechanisms remain poorly understood, although statistical, hydrodynamical, and coalescence models have attempted to predict their behavior. The first observation of such a particle was made by the Belle Collaboration in 2003, with the discovery of the X(3872). This study aims to measure the X(3872) exotic hadron in pp collisions using Run 3 data collected by the ALICE Experiment. During Long Shutdown 2, the ALICE Collaboration upgraded its sub-detectors to enhance data rate, resolution, track reconstruction, and particle identification. The current data-taking period, called Run 3, features much higher statistics in its measurements. The analysis focuses on the $J/\psi\pi^+\pi^-$ decay channel, where the J/ψ decays into electron-positron pairs. To improve the significance of the X(3872) signal, machine learning techniques have been applied, specifically through a boosted decision tree (BDT) classifier. This poster presents the invariant mass spectrum of the $J/\psi\pi^+\pi^-$ channel, along with the distribution of key kinematic variables, using both real data and Monte Carlo simulations generated with Pythia and EvtGen. Measuring the X(3872) with the ALICE Experiment is particularly valuable because it provides access to data at low transverse momentum, a region that other experiments have not extensively explored. This low-momentum analysis is crucial, as it may help determine whether the X(3872) is a compact tetraquark state or a loosely bound molecule of mesons.

Category

Experiment

Collaboration (if applicable)

ALICE Collaboration

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