

Low- p_T ω and ϕ signals at forward rapidity with improved dimuon mass resolution in pp collisions with ALICE

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Abstract

In ultrarelativistic heavy-ion collisions, a state of deconfined quarks and gluons, the quark-gluon plasma (QGP), is created. As the system cools, it evolves into a hot and dense hadronic medium. Precise measurements of the spectral functions of low-mass vector mesons (ρ, ω, ϕ) in the dilepton channel can provide information on possible restoration of chiral symmetry. As part of the ALICE upgrades for the LHC Run 3 period, a new silicon pixel detector, the Muon Forward Tracker (MFT) has been installed covering the forward pseudorapidity region $2.5 < \eta < 3.6$. The inclusion of the MFT in the muon track reconstruction leads to an improvement in mass resolution compared to Run 2, and is expected to allow for effective heavy-flavor background separation, enabling the measurement of ω and ϕ dimuon invariant mass distributions. In this presentation, we report on the analysis of ω and ϕ mesons in the dimuon decay channel at forward rapidity in pp collisions at $\sqrt{s} = 13.6$ TeV. In particular, we demonstrate that the inclusion of MFT information in the muon-track reconstruction improves the mass resolution of the ω and ϕ mesons, particularly at low p_T . We also present the signal-to-background ratio as a function of the dimuon invariant mass obtained with the MFT and the statistical significance of the ω and ϕ yield as a function of p_T . These studies represent a step toward future measurements of the ω and ϕ meson production cross sections, which will provide an essential vacuum baseline for investigating possible in-medium modifications in Pb-Pb collisions.