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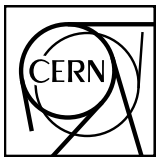

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Supplemental figures: "Measurement of ω meson production in pp and p–Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV"

ALICE Collaboration*

Abstract

This note provides supplementary figures for the paper "Measurement of ω meson production in pp and p–Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV" [1].

Contents

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*See Appendix A for the list of collaboration members

1 Mass resolution correction

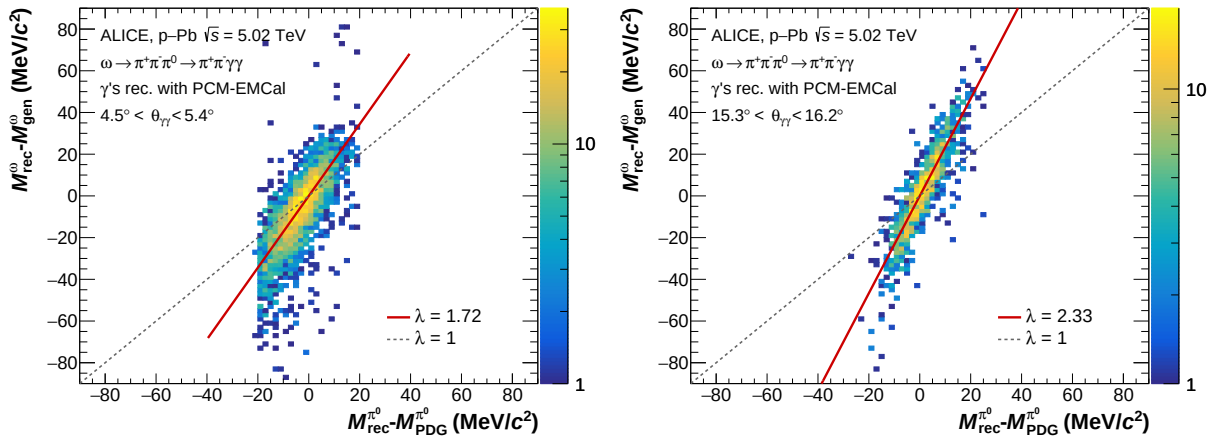

Fig. 1: Correlation between the difference of reconstructed ($M^{\omega}_{\mathrm{rec}}$) and generated ($M^{\omega}_{\mathrm{gen}}$) ω meson masses and the discrepancy of the reconstructed ($M^{\pi^0}_{\mathrm{rec}}$) and nominal mass from the PDG ($M^{\pi^0}_{\mathrm{PDG}}$) of its decay π^0 extracted from all simulated p–Pb collisions using the PCM-EMCal π^0 reconstruction method. The PDG mass is used as a reference for the π^0 mass to enable the use of the found correlation in data in a later step. The small pole width of the π^0 mass [2] enables this approach. Similar 2D-distributions are obtained for all three π^0 reconstruction methods in multiple intervals of the opening angles $\theta_{\gamma\gamma}$ of the π^0 decay. This is done as the correlation is found to depend on $\theta_{\gamma\gamma}$, which can be seen by the difference between the left (small $\theta_{\gamma\gamma}$) and the right (large $\theta_{\gamma\gamma}$). These distributions are parameterized using a first-order polynomial, shown in red, to extract the slope λ of this correlation. The dotted diagonal line represents the assumption, that the discrepancy between the reconstructed and nominal π^0 mass would result in an equal discrepancy of the ω mesons mass, as done in previous work [3, 4].

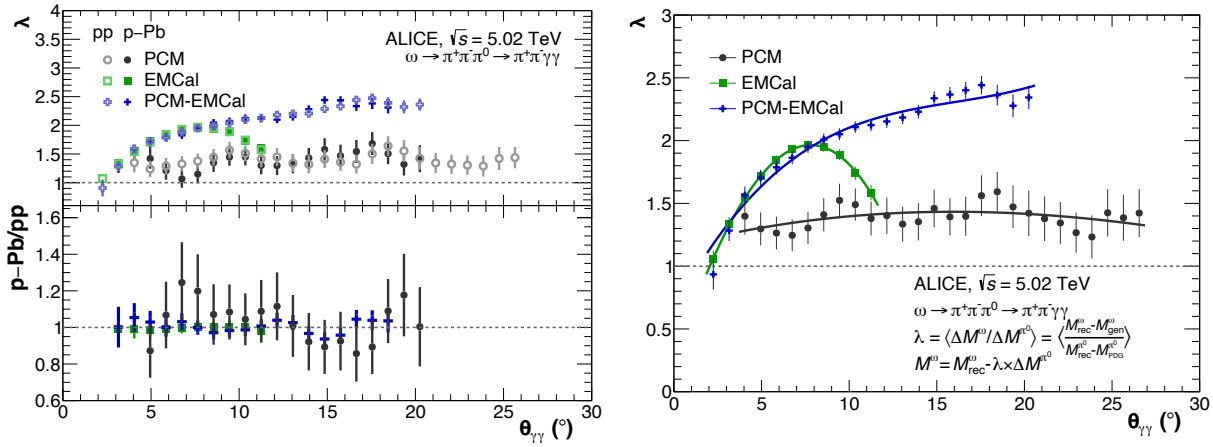

Fig. 2: Extracted slopes λ of the correlations, depicted in Fig. 1 in red, as a function of the opening angle $\Theta_{\gamma\gamma}$ between the two π^0 decay photons. The left-hand plot depicts these slopes extracted individually in simulated pp and p–Pb collisions, with the ratio in the bottom panel showing agreement between the two collision systems. As this correlation is found to be independent of the collision system, the λ parameters are extracted from the summed correlation distributions of the two collision systems. The resulting slopes λ are shown on the right for the three different π^0 reconstruction methods. The equations on the bottom right of this right-hand plot show how λ is determined in MC simulations and then applied in data by rearranging the equation. To reduce the effect of statistical fluctuations, the opening angle dependence of the slope is parameterized with a third-order polynomial, which is then used to shift the mass of each reconstructed ω meson based on its reconstructed mass, the reconstructed mass of its decay π^0, as well as the opening angle.

2 Mass and width of reconstructed ω mesons

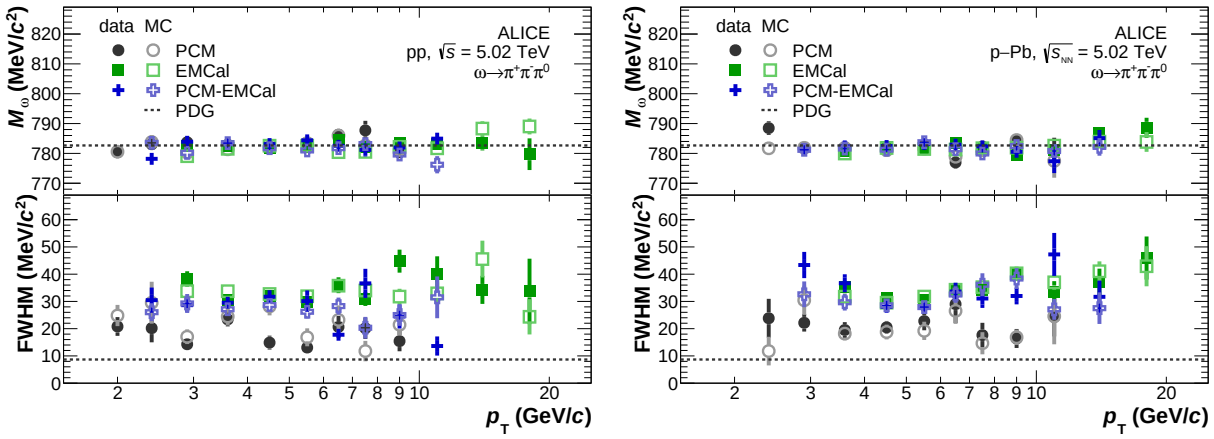

Fig. 3: Mass M_ω and width FWHM of the ω mesons reconstructed using the three different π^0 reconstruction methods for pp (left) and p–Pb (right) from data (closed markers) and MC simulations (open markers). The simulation generally well reproduces the properties reconstructed in data, and the reconstructed mass is in good agreement with the mass cited by the PDG [2].

3 Cross section comparison to other ALICE pp measurements

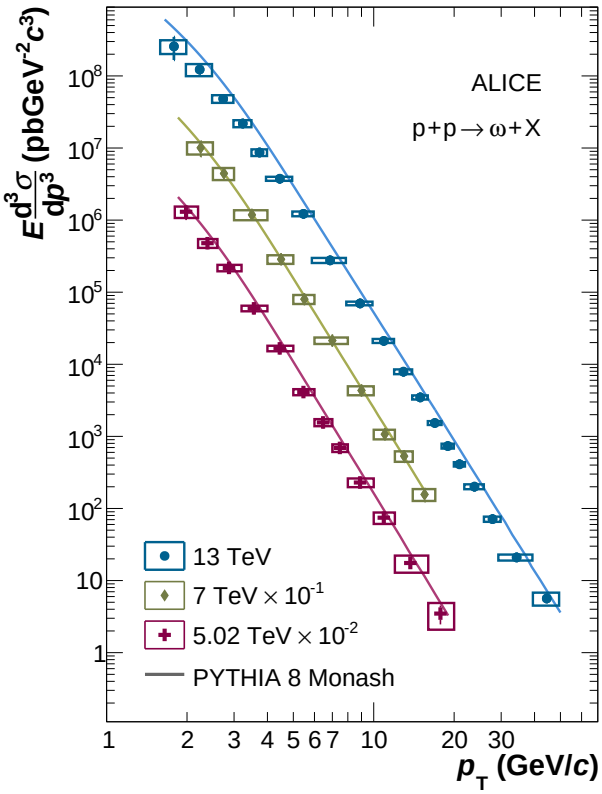

Fig. 4: Compilation of ω meson production cross-sections in pp collisions measured at LHC energies [3, 4], scaled for better visibility, and the respective predictions by the PYTHIA 8 event generator [5] with the Monash 2013 tune [6].

4 Compilation of ω/π^0 ratios at different collision systems and energies

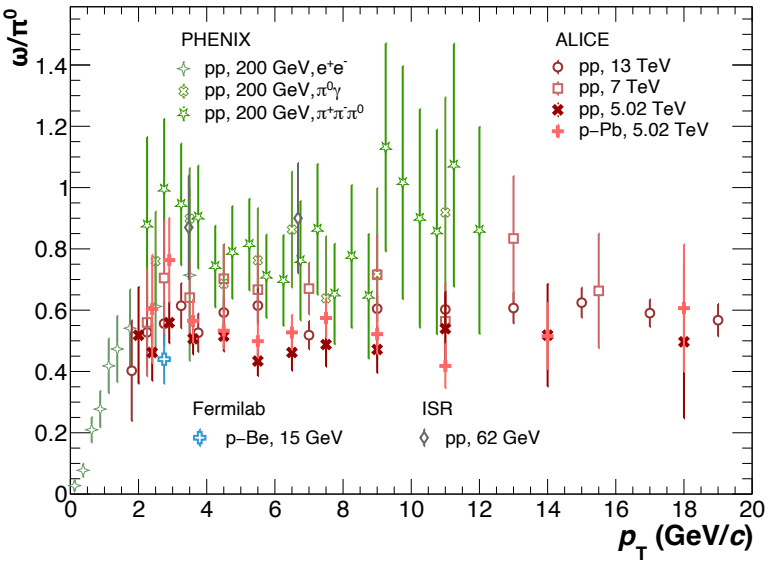

Fig. 5: Compilation of ω/π^0 ratios in pp and p–A collisions for center-of-mass energies covering $0.015 < \sqrt{s_{\rm NN}}$ (TeV) < 13 at Fermilab [7], the ISR [8], PHENIX [9] and ALICE [3, 4], including the two measurements presented in this publication. Vertical error bars represent total uncertainties.

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A The ALICE Collaboration

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