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Light neutral meson production in the era of precision physics at the LHC

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The production of light neutral mesons in different collision systems is interesting for a variety of reasons: In AA collisions the measurements can provide important information on the energy loss of partons traversing the Quark-Gluon Plasma (QGP) which is formed in heavy-ion collisions at the LHC. Measured in pp collisions, neutral meson spectra serve as a reference for pA and AA collisions. Also, they allow us to test with high precision the predictions of perturbative QCD and other model calculations. In pA collisions, cold nuclear matter effects are studied. In addition, decays of π^0 and η mesons are the dominant background for all direct photon measurements. Therefore, pushing the limits of the precision of neutral meson production is key to learning about the temperature and space-time evolution of the QGP.

In the ALICE experiment, which is dedicated to the study of the QGP, neutral mesons can be detected via their decay to two photons. The latter can be reconstructed using the two calorimeters EMCal and PHOS or via conversions in the detector material. Combining the excellent momentum resolution of the conversion photons down to very low transverse momenta (p_{T}) and the high reconstruction efficiency and triggering capability of calorimeters at high p_{T}, we are able to measure neutral mesons and direct photons over a wide transverse momentum range.

Combining state-of-the-art reconstruction techniques with the high statistics delivered by the LHC in Run 2 gives us the opportunity to enhance the precision of our measurements. In this talk, new results together with an overview of neutral meson production in pp, p–Pb and Pb–Pb collisions at LHC energies, as measured with the ALICE experiment will be presented.

Primary authors: ALICE COLLABORATION; SAS, Mike Henry Petrus (Nikhef National institute for subatomic physics (NL))

Presenter: SAS, Mike Henry Petrus (Nikhef National institute for subatomic physics (NL))

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