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Low-mass dielectron measurements in pp, p-Pb and Pb-Pb collisions with ALICE at the LHC

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The production of low-mass dielectrons is one of the most promising tools for the understanding of the chiral symmetry restoration and of the thermodynamical properties of the Quark-Gluon plasma (QGP) created in heavy-ion collisions. At low invariant mass, the dielectron production is sensitive to the properties of vector mesons in the medium and modifications related to the chiral symmetry restoration. In the intermediate mass region ($1.2 < m_{\rm ee} < 2.8 \mathrm{GeV}/c^2$) dielectrons are dominated by correlated electron pairs from heavy-flavour hadron decays, which carry information on the heavy-quark energy loss and collectivity. Thermal radiation from the medium contributes to the dielectron yield over a broad mass range and give insight into the temperature of the medium.

To single out the signal characteristics of the QGP, it is crucial to understand the primordial $\mathrm{e}^+\mathrm{e}^-$ pair production in vacuum, i.e. in minimum-bias proton-proton collisions, and to disentangle hot from cold-nuclear matter effects with p-Pb collisions. Moreover, observations of collective effects in high-multiplicity pp and p-Pb collisions show surprising similarities with those in heavy-ion collisions. The underlying physics processes in such events can be further studied with the measurements of correlated $\mathrm{e}^+\mathrm{e}^-$ pairs.

In this talk, we will give an overview of the latest measurements of $\mathrm{e}^+\mathrm{e}^-$ pair production in pp collisions at $\sqrt{s}$ = 7 TeV and 13 TeV, in p-Pb collisions at $\sqrt{s_{\rm NN}}$ = 5.02 TeV, and in Pb-Pb collisions at $\sqrt{s_{\rm NN}}$ = 2.76 TeV and 5.02 TeV with ALICE. Its implications for the production of heavy quarks and virtual photons will be presented, as well as the dependence of the dielectron spectra with the charged-particle multiplicity in the event, or the centrality of the collision. In Pb-Pb collisions, the comparison of the measured dielectron yield with the expectation from known hadronic sources will be discussed.

Content type

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Collaboration

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