Measurement of isolated photon-hadron correlations in Pb-Pb collisions with the ALICE experiment at LHC

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The heavy-ion physics program in collider experiments aims at exploring the strong interaction by studying the properties of the quark-gluon plasma (QGP) formed in ultra-relativistic nuclei collisions.

The QGP is a state of matter predicted by the Quantum Chromodynamics (QCD) theory and composed of a colored medium in equilibrium in which quarks and gluons do not form hadrons.
The ALICE experiment at LHC (CERN) allows to investigate the QGP properties and to validate QCD theoretical models. In particular, it permits to constrain the models that describe high-energy quarks and gluons (partons) energy loss due to their interaction with the coloured medium.

Experimentally, this can be done measuring hadrons issued by the fragmentation of the partons escaping the QGP and compare such measurements with respect to smaller collision systems like proton-proton without, a priory, the creation of such matter.

In this context, hadrons correlated with isolated photons are a promising channel to study the energy loss in heavy-ion collisions, as photons do not interact strongly and the measurement of direct prompt photons produced in Compton and annihilation processes can therefore constrain the Q^2 of the initial hard scattering.
The photon provides an energy and direction reference for the associated parton produced in such processes, while the information about the parton interaction with the QGP is given by the hadrons located on the opposite side from the photon.

In this presentation, the first measurement of photon-hadron correlations at $\sqrt{s_{NN}} = 5.02$ TeV in Pb-Pb collisions with the ALICE experiment is shown.