

Photon and neutral pion production in pp and PbPb collisions at LHC energies in the ALICE experiment.

Abstract

This talk is dedicated to the measurements of direct photons and neutral pions in pp at $\sqrt{s}=2.76$ and 7 TeV and Pb-Pb collisions at $\sqrt{s}=2.76$ TeV per nucleon pair. Photons are measured in ALICE at mid-rapidity in two electromagnetic calorimeters PHOS (Photon Spectrometer) and EMCal and via the measurement of the electron-positron pairs in the TPC and ITS, produced by the interaction of the photons with the material of the detector. The neutral pions are identified via the invariant mass analysis of photon pairs. The combination of different detection methods allows to measure the spectra of particles with high precision over the wide dynamical range.

The measurements of direct photons contribute significantly to the main goal of the ALICE experiment, the study of the Quark-Gluon Plasma (QGP), which is expected to be created in heavy-ion collisions. Photons are produced during the different stages of the expansion of the initial hot-matter fireball, and they interact weakly with other particles, escaping almost unchanged carrying information about the properties of the matter at the space-time point of their emission.

The direct high-energy photons, formed at the early stage of the collision, provide a test of perturbative QCD, set constraints on the parton distribution and fragmentation functions and allow to reconstruct the initial energy of jets produced by high-energy quarks. Thermal photons result from interactions of particles in both hot QGP and cooler Hadron Gas phases, they carry information about the temperature of the medium. The spectra of photons and the effective temperature extracted from the thermal photon yield will be presented and compared with the results of the RHIC PHENIX experiment.

The measurement of neutral pions yields allows to investigate the medium-induced energy loss of particles by studying the transverse momentum dependence of the nuclear modification factor R_{AA} as a function of collision centrality. A systematic decrease of the R_{AA} with increasing centrality is observed and compared with that for charged pions and with similar results at RHIC energies.