

## Strangeness in Quark Matter 2019



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# Direct photon and light neutral meson production in the era of precision physics at the LHC

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The ALICE experiment is dedicated to the study of the quark-gluon plasma (QGP) formed in heavy-ion collisions. To investigate the initial state and space-time evolution of the medium, direct photons are excellent probes because they don't interact strongly. In particular, the low  $p_T$  thermal photon spectrum and flow measurements carry information about the medium's temperature and development of collective flow. Analogous studies in p-A collisions help to disentangle cold nuclear matter effects from modifications due to the presence of the medium.

The production of light neutral mesons in A-A collisions can on one hand provide important information on the energy loss of partons traversing the quark-gluon plasma. On the other hand, decays of  $\pi^0$  and  $\eta$  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 properties of the QGP. In the ALICE experiment, photons can be detected with either of the two electromagnetic calorimeters, EMCal and PHOS, as well as via reconstruction of  $e^+ e^-$  pairs from conversions in the detector material using the central tracking system. Neutral mesons are measured via their decay to two photons. Combining the excellent momentum resolution of the conversion photons down to very low transverse momenta and the high reconstruction efficiency and triggering capability of calorimeters at higher  $p_T$ , we are able to measure neutral mesons and direct photons over a wide transverse momentum range. In addition, the statistics delivered by the LHC in Run 2 gives us the opportunity to enhance the precision of our measurements.

In this talk, the direct photon and neutral meson production in pp, p-Pb and Pb-Pb collisions at LHC energies, as measured with the ALICE experiment, will be discussed.

### Collaboration name

ALICE

### Track

QCD phase diagram and critical point

**Primary author:** DANISCH, Meike Charlotte (Ruprecht Karls Universitaet Heidelberg (DE))

**Presenter:** DANISCH, Meike Charlotte (Ruprecht Karls Universitaet Heidelberg (DE))

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