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Photon identification in the ALICE EMCal using a neural network and template fit

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Photon identification in the ALICE EMCal using a neural network and template fit
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The measurement of isolated photon-tagged correlations of jets and jet fragments is a promising channel for the study of partonic energy loss in heavy-ion collisions. Isolated photons are an excellent probe because they constrain the parton kinematics of the initial hard scattering. For prompt photon measurements, the main background are photons from the decays of neutral mesons. Photons are measured in the ALICE electromagnetic calorimeter (EMCal) and reconstructed as EMCal clusters. Higher- p_T neutral mesons decay into photons with a small opening angle, which can produce a single cluster with both photons when the photon showers overlap; this starts to happen for neutral pions at around 6 GeV/c, for example. A deep neural network is trained to distinguish between clusters containing one or two photons. Thus the energy distribution in the cluster (the “shower shape”) can be encoded with the output of this deep neural network as well as with a geometric variable. The shower shape distribution of isolated clusters in the data can then be fit to two templates. The purity can then be extracted from the result of the template fit and is used in the isolated photon correlation measurements. This poster will present the details and results of calculating the photon purity with a template fit procedure using both the deep neural network and the geometric variable in multiple collision systems. The photons are measured in a p_T range (12–60 GeV/c) that provides access to a regime in which the largest modifications due to the QGP are expected and which is thus far unexplored. However, this p_T range is technically challenging due to the large number of neutral mesons produced relative to prompt photons.

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