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Study of direct photon production in Pb-Pb collisions at √sNN = 5.02 TeV with ALICE experiment's Photon Spectrometer (PHOS) at Large Hadron Collider

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The Quark-Gluon Plasma (QGP), comprising deconfined quarks and gluons, is believed to have existed in the Universe shortly after the Big Bang. As the QGP cools, it transitions into the hadronic matter that we observe today. In laboratory settings, small-scale "Big Bangs" are artificially created through high-energy heavy-ion collisions, which heat the hadronic matter above the transition temperature, approximately 150 MeV, leading to the formation of the QGP. Direct photons serve as unique probes in high-energy proton-proton and nucleus-nucleus collisions, interacting weakly with the dense and hot quark-gluon medium formed during these events. These photons escape freely, providing undistorted information about the collision's evolution. In the Photon Spectrometer of the ALICE experiment at the Large Hadron Collider at CERN, photons, originating from the collisions of lead nuclei at energy √sNN = 5.02 TeV , are measured with very high precision. By disentangling the contributions of decay, prompt and thermal photons emitted during these collisions, we can estimate the effects of cold and hot nuclear matter and gain insights into the temperature, correlations, and collective phenomena within the QGP.

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