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Dimuons from photon-photon fusion in ultraperipheral and hadronic Pb+Pb collisions with ATLAS

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Relativistic heavy-ion beams are accompanied by a large flux of equivalent photons, giving rise to a set of photon-induced processes. These can lead to photon-photon interactions in both ultraperipheral collisions, where the nuclei do not overlap, as well as in hadronic processes accompanied by the production of hot, dense matter. The latter provides a potentially sensitive electromagnetic probe of the quark-gluon plasma. This talk presents a series of measurements of such processes performed by the ATLAS Collaboration. New measurements of exclusive dimuon production, which provide detailed constraints on the nuclear photon flux and its dependence on impact parameter and photon energy. In particular, the study of the dimuon cross sections in the presence of forward neutron production provides an additional experimental handle on the impact parameter range sampled in the observed events. First measurements by ATLAS and STAR of dileptons produced via two-photon scattering in non-ultra-peripheral (non-UPC) nucleus-nucleus collisions showed an unexpected centrality-dependent broadening of the angular correlation between the two leptons and/or of the two-lepton p_{T} distribution. ATLAS has recently measured dimuons produced via two-photon scattering in non-UPC Pb+Pb collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV using an integrated luminosity of $1.9\ \mathrm{nb}^{-1}$. This data set represents a factor of ~ 4 increase in statistics over the 2015 data set used for the first ATLAS measurement. The increased statistics allow new features to be observed in the data, both in the yields of the pairs as well as in their angular distributions. Differential measurements of the dependence of the pair-distribution on the transverse-momentum and rapidity of the two muons, as well as the dependence on the event centrality will be presented, and the possible physics implications will be discussed.

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