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Detection of medium induced parton momentum broadening using photon-tagged jets with the CMS detector

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Azimuthal angle ($\Delta\phi$) and transverse momentum (p_{T}) correlations of isolated photons and associated jets, which are sensitive to medium induced parton momentum broadening, are reported for the first time with the latest high statistics pp and PbPb data recorded with the CMS detector at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV. The fully corrected photon+jet azimuthal correlation and p_{T} imbalance in PbPb collisions are studied as a function of collision centrality and photon p_{T}. In addition, a novel measurement of the decorrelation of jet axes calculated with the energy weight and the winner-take-all schemes (δ_{jj}) is reported for the first time. This new observable is insensitive to the initial state radiation which significantly smears the photon+jet azimuthal correlation. A significant modification of δ_{jj} is reported, which signals a direct detection of in-medium momentum broadening of the leading parton inside the jet. Furthermore, the transverse energy spectra and nuclear modification factors (R_{AA}) of isolated photons will be discussed.

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