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Transverse momentum balance of dijets in Xe+Xe collisions at the LHC

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We present a theoretical study of the medium modifications of the p_{T} balance (x_{J}) of dijets in Xe+Xe collisions at $\sqrt{s_{\mathrm{NN}}} = 5.44$ TeV. The initial production of dijets was carried out using the POWHEG+PYTHIA8 prescription, which matches the next-to-leading-order (NLO) QCD matrix elements with the parton shower (PS) effect. The SHELL model described the in-medium evolution of nucleus-nucleus collisions using a transport approach. The theoretical results of the dijet x_{J} in the Xe+Xe collisions exhibit more imbalanced distributions than those in the p+p collisions, consistent with recently reported ATLAS data. By utilizing the Interleaved Flavor Neutralisation, an infrared-and-collinear-safe jet flavor algorithm, to identify the flavor of the reconstructed jets, we classify dijets processes into three categories: gluon-gluon (gg), quark-gluon (qg), and quark-quark (qq), and investigated the respective medium modification patterns and fraction changes of the gg, qg, and qq components of the dijet sample in Xe+Xe collisions. It is shown that the increased fraction of qg component at a small x_{J} contributes to the imbalance of the dijet; in particular, the $q_1 g_2$ (quark-jet-leading) dijets experience more significant asymmetric energy loss than the $g_1 q_2$ (gluon-jet-leading) dijets traversing the QGP. By comparing the $\Delta\langle x_{\mathrm{J}}\rangle = \langle x_{\mathrm{J}}\rangle_{\mathrm{pp}} - \langle x_{\mathrm{J}}\rangle_{\mathrm{AA}}$ of inclusive, $c\bar{c}$ and $b\bar{b}$ dijets in Xe+Xe collisions, we observe $\Delta\langle x_{\mathrm{J}}\rangle_{\mathrm{incl.}} > \Delta\langle x_{\mathrm{J}}\rangle_{\mathrm{cc}} > \Delta\langle x_{\mathrm{J}}\rangle_{\mathrm{bb}}$. Moreover, $\rho_{\mathrm{Xe,Pb}}$, the ratios of the nuclear modification factors of dijets in Xe+Xe to those in Pb+Pb, were calculated, which indicates that the yield suppression of dijets in Pb+Pb is more pronounced than that in Xe+Xe owing to the larger radius of the lead nucleus.

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