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Averaged jet charge as a probe of quark gluon plasma in heavy-ion collisions

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Averaged jet charge characterizes the electric charge distribution inside jets, and provides a powerfull tool to distinguish quark jets from gluon jets. In this talk, we give the first prediction for the medium nodification of averaged jet charge in heavy-ion collision at the LHC energy, where the jet productions in pp collisions are simulated by pythia6+FastJet, and parton energy loss effects in the QGP are calculated with two Monte Carlo codes of jet quenching: PYQUEN and JEWEL. In pp collisions, the value of jet charge for quark jets goes up with increasing jet transverse momentum, while for gluon jets it approximates to zero in the whole range of p_T because gluon carries no electric charge. It is shown that the distribution of averaged jet charge is significantly suppressed by initial state nuclear effects due to the participants of neutrons with zero electric charge during nuclear collisions. Considerable enhancement of averaged jet charge in central $PbPb$ collisions relative to peripheral collisions is observed, since jet quenching effect is more pronounced in central collisions. In the jet quenching calculations, a fast gluon will lose more energy in the QGP than a fast quark due to its large color-charge($\Delta E_g/\Delta E_q = C_A/C_F = 9/4$), more quarks with electric charge may survive in central collisions as compared with that in peripheral $PbPb$ collisions. The fraction of quark jet will be increased, which results in the larger value of averaged jet charge in central collisions than that in peripheral reactions. Distinct feature of averaged jet charge between quark and gluon jets, together with the sensitivity of jet charge alternations to flavour dependence of parton energy loss, could be very useful to discriminate the energy loss pattern between quark and gluon jets in heavy-ion collisions.

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