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Jet quenching in Z/W+jet in heavy-ion collisions

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Gauge boson tagged jet production has long been regarded as a “golden channel” to study the jet quenching effect. Recently, the back-to-back azimuthal alignment $\Delta\phi_{jZ}$, p_T asymmetry x_{jZ} distribution and its mean value, as well as the average number of jet partners per Z boson R_{jZ} of Z associated jet production have been reported in both pp and Pb-Pb collisions by CMS.

In the talk, we report the theoretical calculations of Z/W+jet production in pp and Pb-Pb at the LHC, which are confronted with all available data and very nice agreements between theory and data are observed for all four observables of Z+jet in both pp and Pb-Pb collisions. In the model, a very good description of Z+jet in pp is achieved by utilizing Sherpa, which combines the NLO with resummation by a matched parton shower (PS). To compute observables of Z+jet in Pb-Pb we consider the parton energy loss in hot/dense QCD medium, which is simulated by Linear Boltzmann Transport(LBT) model. Our calculations of distributions of $\Delta\phi_{jZ}$ and R_{jZ} can give excellent descriptions of CMS measurements both in pp and Pb-Pb for the first time. Compared to pp collisions, R_{jZ} is suppressed and smaller fraction of jets is lost for larger initial jet parton energy in Pb-Pb collisions. The distribution of $\Delta\phi_{jZ}$ at large azimuthal angle in Pb-Pb is suppressed relative to that in pp, because jet quenching effect will reduce the contributions of multiple-parton processes. We evaluate the transverse momentum imbalance x_{jZ} simultaneously which is broadened and shifted to lower value, and we find a very good agreement with LHC data for both x_{jZ} distribution and its mean value. Predictions for several observables of W+jet in pp and Pb-Pb collisions are also presented for completeness.

Content type

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