

Prospects for measuring quark polarization and spin correlations in b-bbar and c-cbar samples at the LHC

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Polarization and spin correlations have been explored very little for quarks other than the top. Utilizing the partial preservation of the quark's spin information in baryons in the jet produced by the quark, we examine possible analysis strategies for ATLAS and CMS to measure the quark polarization and spin correlations in $pp \rightarrow q\bar{q}$ processes. We find polarization measurements for the b and c quarks to be feasible, even with the currently available datasets. Spin correlation measurements for $b\bar{b}$ are possible using the CMS Run 2 parked data, while such measurements for $c\bar{c}$ will become possible with higher integrated luminosity. We also provide LO QCD predictions for the polarization and spin correlations expected in the $b\bar{b}$ and $c\bar{c}$ samples with the relevant cuts. These proposed measurements can provide new information on the polarization transfer from quarks to baryons and might even be sensitive to physics beyond the SM.

Alternate track

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