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Measuring Polarized Gluon Distributions by Heavy Quark Spin Correlations and Polarizations

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The production of heavy flavor quark pairs, including top-anti-top, at the LHC proceeds primarily through gluon fusion. The correlation between the gluon spins affects various spin correlations between the produced quark and anti-quark. Both single spin asymmetries and double correlations of the quark pair spins will be manifest in the subsequent hadronization and decay distributions. For top pairs this is most pronounced. Dilepton, single lepton, and purely hadronic top pair decay channels allow for the extraction of gluon spin information as well as providing a window into possible interactions Beyond the Standard Model. The derivations of many spin related asymmetries and polarizations will be presented. The implications for experimental determination will be discussed.

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