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Hadronic Top Quark Polarimetry with ParticleNet

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Observables sensitive to top quark polarization are important for characterizing and discovering new physics. The most powerful spin analyzer in the top decay is the down-type fermion from the W, which in the case of leptonic decay allows for very clean measurements. However, in many applications, it is useful to measure the polarization of hadronically decaying top quarks via an optimal hadronic spin analyzer. In this talk, we introduce and use jet flavor tagging to significantly improve spin analyzing power in hadronic decays beyond exclusive kinematic information employed in previous studies. We provide parametric estimates of the improvement from flavor tagging with any set of measured observables and demonstrate this in practice on simulated data using a Graph Neural Network (GNN).

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