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NLO corrections and factorization for transverse single-spin asymmetries

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We present next-to-leading order QCD corrections for the cross sections of $\ell p^\uparrow \rightarrow (h \text{ or } jet)X$ with transversely polarized initial protons. These cross sections are known to be power-suppressed in QCD and probe twist-3 parton correlation functions in the proton. Our calculation exhibits the full complexity of a perturbative QCD analysis beyond leading power, involving in particular various derivatives of the parton correlation functions. We demonstrate that collinear factorization for these single-spin observables holds at one loop. We also present exploratory phenomenological results for the NLO single-spin asymmetry in $ep^\uparrow \rightarrow hX$ and compare to data from the HERMES experiment.

Primary authors: REIN, Daniel (Universität Tübingen); SCHLEGEL, Marc (University of Tuebingen); TOLLKÜHN, Patrick (Universität Tübingen); VOGELSANG, Werner (Univ. Tuebingen)

Presenter: REIN, Daniel (Universität Tübingen)

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