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Proton spin structure from large momentum effective theory

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Understanding the spin structure of the proton has been an important goal in hadron physics. One of the well-known spin sum rule, the Jaffe-Manohar sum rule, is motivated from a free-field expression of QCD angular momentum and has a natural partonic interpretation. However, this natural partonic sum rule exhibits a gauge dependence in its individual contributions (apart from the quark spin). I will explain how these individual contributions arise from gauge-invariant, but frame-dependent operator matrix elements in the spirit of the large momentum effective theory, which also provides a practical possibility to compute the partonic orbital angular momentum in the proton. I will also explain how to compute parton distribution functions following the same spirit.

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