

# Semi-Inclusive DIS in the Target Fragmentation Region

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We report our recent progress on the study of semi-inclusive deep inelastic scattering in the target fragmentation region with a polarized lepton beam and polarized nucleon target. In this region, the nonperturbative effects are factorized into fracture functions. We derive the results of structure functions up to twist-3 at the tree level of pQCD, and up to one loop level at twist-2. At the tree level, there are four structure functions at twist-2 and eight structure functions at twist-3. At one loop and twist-2, another six structure functions become nonzero in which four are generated uniquely by the gluon fracture functions. By combining the results, all eighteen structure functions for the process are predicted. Azimuthal and spin asymmetries are discussed in connection with relevant experiments.

## References:

- [1] K.B. Chen, J.P. Ma and X.B. Tong, JHEP 05(2024)298.
- [2] K.B. Chen, J.P. Ma and X.B. Tong, Phys. Rev. D 108 (2023) 094015.

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