

The main goal of this thesis is to investigate azimuthal asymmetries in semi-inclusive deep inelastic scattering (SIDIS) of polarized muons on unpolarized nucleons using data collected by the COMPASS experiment at CERN. With a larger data sample than in previous studies, we aim towards reducing statistical errors of the results. To fully understand the azimuthal modulations, this thesis gives a brief introduction to the theory of the transverse momentum dependent parton distribution functions (TMD-PDFs). We describe SIDIS process as well as the COMPASS detector set-up for SIDIS measurements and examine the process of generating Monte Carlo simulations through beam file extraction studies. The results of our analysis contribute to ongoing efforts to better understand the quark-gluon structure of the nucleon, and the interplay between TMD-PDFs and azimuthal asymmetries in SIDIS.