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COMPASS polarized target for pion-induced Drell-Yan experiment

The Drell-Yan (DY) process is considered to be a powerful tool to study hadron structure. A new generation of polarized DY measurements using unpolarized pion beam and polarized target is under the preparation at COMPASS experiment at CERN. One of the key experimental tasks here is the modification of the unique COMPASS low temperature polarized target for Drell-Yan experiment which is the prerequisite to cope with high heat input from the pion beam. This includes the preparation of the new target holder, high frequency polarizing cavity and nuclear magnetic resonance (NMR) system for measuring of target polarization in Drell-Yan studies. At COMPASS the unpolarized pion beam with momentum of 190GeV/c and intensity up to $10|8$ pions/s will interact with transversely polarized proton target producing muon pair via Drell-Yan process. The solid NH3 is polarized by dynamic nuclear polarization (DNP) method. Maximum polarization reached during data taking is expected to be up to 90 %. Two target cells with gap of 20 cm, each 55 cm long and 4 cm in diameter give target cell volume about 690 cm3. The microwave cavity has one central microwave stopper. Non-interacting beam and other particles produced inside the target will be stopped in the hadron absorber after the polarized target. This absorber will worsen somewhat the vertex resolution in comparison with present COMPASS system. Among the first distributions to be studied at COMPASS DY experiments are Sivers, Boer-Mulders and pretzelosity TMDs as well as transversely polarized quark distributions. These measurements will make it possible to test a most important prediction of QCD. The Drell-Yan data taking is expected to start in 2014 - 2015 for period of approximately 180 days. Current status of the polarized target, the required modifications and future plans will be presented.

Summary

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