Recent results and future perspectives of the high-energy spin physics program at RHIC at BNL

Bernd Surrow

Massachusetts Institute of Technology

surrow@mit.edu

The STAR experiment at the Relativistic Heavy-Ion Collider at Brookhaven National Laboratory is carrying out a spin physics program in high-energy polarized proton collisions at $\sqrt{s} = 200\,\mathrm{GeV}$ and $\sqrt{s} = 500\,\mathrm{GeV}$ to gain a deeper insight into the spin structure and dynamics of the proton.

One of the main objectives of the spin physics program at RHIC is the precise determination of the polarized gluon distribution function. The STAR detector is well suited for the reconstruction of various final states involving jets, π^0, $\pi^{\pm}$, $\mathrm{e}^{\pm}$ and γ, which allows to measure several different processes. Recent results will be shown on the measurement of jet production and hadron production at $\sqrt{s} = 200\,\mathrm{GeV}$.

The RHIC spin physics program has recently completed the first data taking period in 2009 of polarized p+p collisions at $\sqrt{s} = 500\,\mathrm{GeV}$. This opens a new era in the study of the spin-flavor structure of the proton based on the production of $W^{-(+)}$ bosons. $W^{-(+)}$ bosons are produced in $\bar{u} + d\,(\bar{d} + u)$ collisions and can be detected through their leptonic decays, $e^- + \bar{\nu}_e\ (e^+ + \nu_e)$, where only the respective charged lepton is measured. The discrimination of $\bar{u} + d\ (\bar{d} + u)$ quark combinations requires distinguishing between high p_T $e^{-(+)}$ through their opposite charge sign, which in turn requires precise tracking information. Recent STAR results on the first measurement of W^-/W^+ boson production in polarized $p-p$ collisions will be shown along with a discussion of future perspectives involving the STAR Forward GEM Tracker.