

The Absolute Polarimeter for RHIC

A. Bravar (for the Jet Polarimeter Collaboration)

The RHIC Spin program aims to determine the spin asymmetries for a variety of processes with high precision, such to allow significant comparison with theoretical predictions and possibly unveil new physics. A crucial requirement is the knowledge of the absolute polarization of the RHIC polarized protons beams to 5% or better.

The chosen polarimetric process is pp elastic scattering in the very small $-|t|$ Coulomb Nuclear Interference (CNI) region of $0.001 < |t| < 0.02 \text{ GeV}^2$, where the analyzing power A_N reaches a maximum of about 4.5%. The present knowledge on A_N , however, is not sufficient to obtain the desired precision. For this reason a new measurement of A_N to about 0.1% is required.

For this purpose an internal polarized gas jet target is being built. The target will be discussed by Tom Wise at this conference. This presentation will discuss the beam polarization measurement.

The jet will deliver polarized protons with a polarization near 90% and a density of about $5 \times 10^{11} \text{ p/cm}^2$. The target polarization will be determined with a Breit-Rabi polarimeter to better than 3%. The low energy recoil protons, originating from the pp elastic scattering in the CNI region, will be detected with a recoil spectrometer based on silicon detectors. The recoil technique is powerful enough to determine precisely the event kinematics and suppress almost all the inelastic background in the CNI region. The method, the recoil setup, the attainable precisions and the systematic uncertainties will be presented and discussed.

This method will provide a reliable and efficient tool to measure the absolute beam polarization and to calibrate the local polarimeters in a relatively short time. Also, it will allow studying various aspects of the spin dependence in pp elastic scattering.