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A Summary of the RHIC Spin Collaboration Workshop

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This workshop, a monthly one day meeting to discuss the spin program, covered the ongoing analysis and presentations of data from the 2001/2 spin run, and preparations for the 2003 spin run.

For the ongoing analysis, many studies of the systematic errors in the polarimeter data have now been made, and we are close to deciding on a "standard" systematic error, to be used by experiments in articles on their results. Osamu Jinnouchi presented these studies. An important issue for the presentation of our results is the fact that the analyzing power of our RHIC polarmeter is not known at 100 GeV. The "standard" to use for absolute polarization at 100 GeV was discussed. It will be important to report cross sections as well as spin asymmetries. Cross sections require an absolute luminosity from vernier scans of one beam across the other. The status of analyzing these scans was given by Angelika Drees, and PHENIX studies for the cross section were presented by Sergei Belikov.

A major issue for the 2001/2 run was the low AGS polarization. We are preparing an AGS run to try to increase the polarization, and this is scheduled for January 2003. The RHIC spin run is scheduled for April-May 2003. Leif Ahrens discussed preparations for the AGS. A major difficulty last year was a slow ramp rate in the AGS, from using the backup power supply while the normal supply, from Siemens, was being repaired. The Siemens supply was tested and then connected to the AGS just after this meeting, so we expect we will have the faster ramp rate for the 2003 run. Also, a new CNI polarimeter is being installed for the AGS, which will allow fast and precise polarization measurements to give quick feedback to the polarization studies. There will be a workshop in Ann Arbor on the AGS polarization November 7-9.

Osamu Jinnouchi described improvements for the RHIC polarimeters for 2003, based on the studies of the 2001/2 data. An important addition is to be able to calibrate the energy response of the silicon detectors automatically. Last year, ^{241}Am alpha sources were installed and used, but only weekly because attenuators had to be inserted by hand for the calibration. The RHIC polarimeter data acquisition is based on a novel wave form digitizer (WFD) which is based on ADC chips used for laptop screens. The wave forms from the silicon strips are digitized every 2.4 ns and sent to an onboard FPGA Xilinx chip, the pulse height and time relative to the RHIC rf clock is obtained, a selection is made for carbon

recoils, and the data is collected into histograms for each silicon strip and for each proton bunch. Satish Dhawan described the WFDs, which will be used also for the AGS polarimeter and for the polarized hydrogen jet experiment being prepared for 2004.

For the 2003 run, both STAR and PHENIX will run with longitudinal polarization, obtaining the first data sensitive to the gluon polarization in protons. These measurements will be from asymmetries corresponding to whether the helicities of the two beams are parallel or anti-parallel. To measure this asymmetry, we must normalize our data to the parallel and anti-parallel luminosities. These luminosities can be different for each crossing due to differences in the bunches—emittance and/or intensity. Mei Bai described plans for a spin-flipper which can reverse the polarization of one ring. This is very important for the experiments, since it flips the relationship between parallel and anti-parallel helicities for each crossing. We expect that the spin flipper should greatly reduce systematic errors in the measurements. We discussed the procedure—notifying the experiments, and changing the spin pattern broadcast by RHIC to the experiments. Polarimeter measurements will be taken before and after using the spin flipper. The steps involve detuning the Siberian Snakes in the ring we are flipping, applying the rf dipole at IP4 (the spin flipper), and then retuning the Snakes. The Snakes are slow devices, so that the time required will be minutes. We discussed leaving the Snakes detuned, and flipping only one ring. Although this would then take just seconds, we decided that it will be important to have all combinations of spin states for each crossing. We need to decide on the notification procedure.

Werner Vogelsang described new results from next to leading order calculations for our proposed measurements of gluon polarization, using jets and pions. A new paper has just been completed,

http://arxiv.org/abs/hep-ph/0211007

They find that the NLO spin results have very little dependence on the theoretical factorization scale, giving a more robust prediction from QCD.

There will be a review of the polarized jet experiment to measure the absolute polarization for RHIC, November 18-19. The next RHIC Spin Workshop will be in early December, but needs to be scheduled.