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Polarimetry for run 11 (Status report)

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Overview

- HJet provides absolute measurement of both beams polarizations for the experiments. Goal 2011 – 5% in 8 hours.
- pC provides:
 - fast polarization monitor (including bunch per bunch polarization)
 - polarization profile (and correction to the absolute value)
 - ramp measurement



HJet upgrade for run 2011

In 2009 HJet provided approximately 7% error in 8 hours. Right now we cover ~1/3 of useful area: 6 detectors ~ 40 cm² each. **Double detector area ~ double statistics with about the same analyzing power ~** $1/\sqrt{2}$ of error.

We are going to install more detectors, keeping the same number of channels.



Main problem of run 2009 – rate dependence, coming from amplifier saturation etc.

Waveforms from pulser in the scope (1st bunch only, after shaper)



Waveforms from pulser in the scope - analysis



pC changes for run 2011

Solution – faster signals without "memory":

- Change preamplifiers from charge-sensitive with characteristic time
- 3 us to fast current-sensitive with pulse width FWHM ~ 10 ns.
- Remove shapers.
- Move digitization close to the polarimeters (to the tunnel).



Debug software for ramp measurement

Tests with AGS during this run



Questions:

- Can our DAQ survive in the tunnel?
- Can we select carbon events?
- ➤ Will new amplifiers cure the rate effects seen with the old?
- > Will the new system provide rate independent asymmetry measurement?

On the way to get answers...

The setup was put in the AGS tunnel 2.5 weeks ago.

Till now system survives in the AGS radiation conditions. We see "bananas" with the new system as well as with the old system. We did a stress test with thick target high intensity unpolarized beam and see no problems with new amplifiers, while problems similar to RHIC pC polarimeter in $\sqrt{s} = 500$ GeV run were reproduced in the old system. We would like to measure asymmetry.

Time versus amplitude



Time versus amplitude





High intensity test – pulser. Old amplifiers

- 12 bunches, unpolarized beam. Intensity in the ring $0.6 16 \cdot 10^{11}$.
- 2 targets of different thickness.
- Rates compatible to RHIC rates per strip in "banana" 2.5 160 kHz.



High intensity test – pulser. New amplifiers.



High intensity test – mass shift.

