

RHIC Polarimeter Data Format

K. Kurita

RHIC Spin Collaboration Meeting

October 1, 2001

RIKEN BNL Research Center, Brookhaven National Laboratory

RHIC Polarimeter Data Format

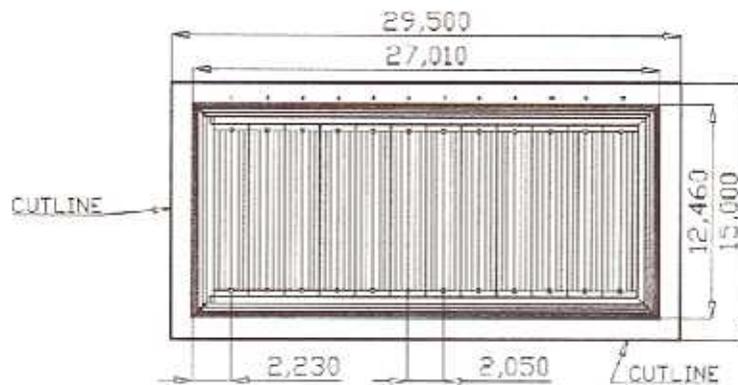
RSC collaboration meeting
Oct. 1, 2001
Kazu Kurita (RBRC)

Outline

- 1, Polarimeter geometry
- 2, Configuration of run2001
- 3, Proposed data format for distribution

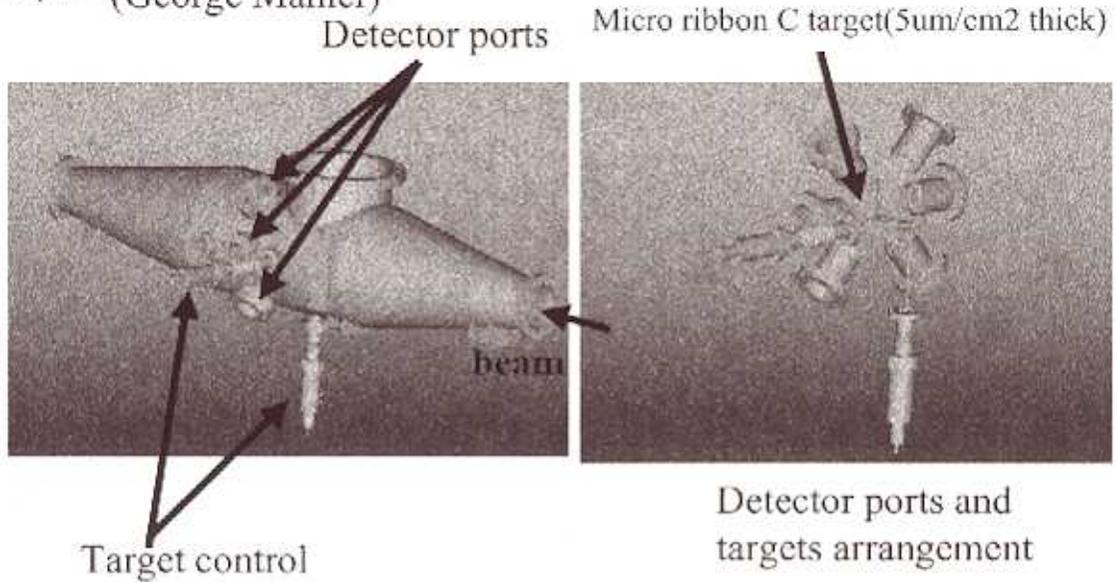
Si design

- Boron(front) and Phosphor(back) implantation
- Bare Si surface
- 2mmx10mm x 12 strips
- small capacitance + thin dead layer

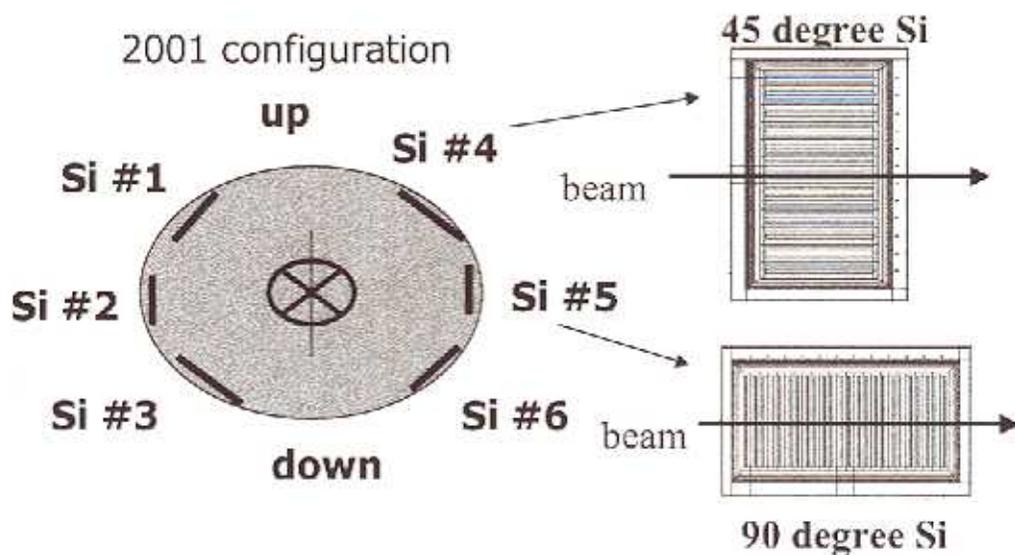


Chamber Design

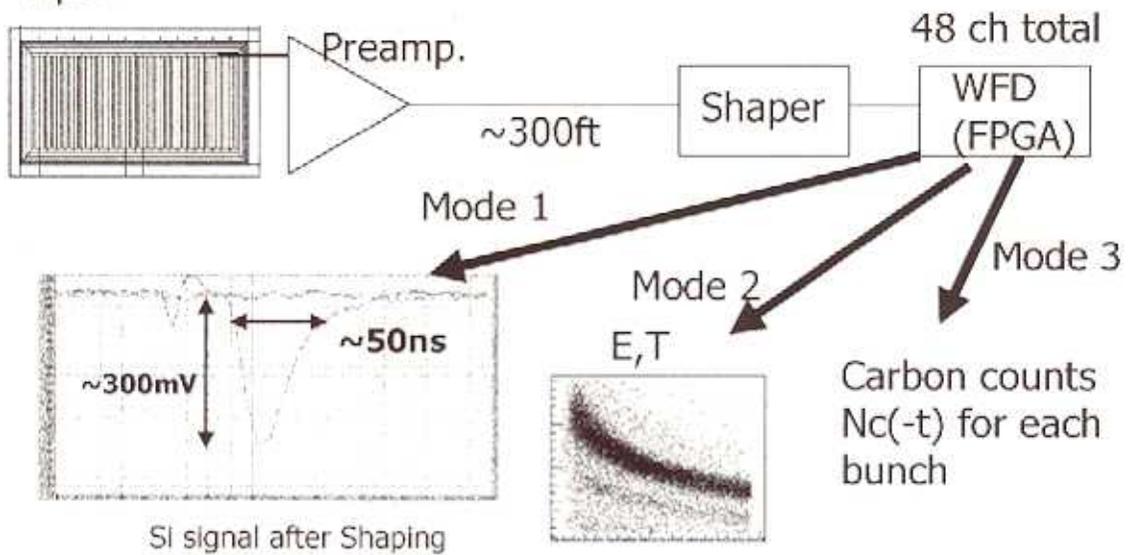
(George Mahler)



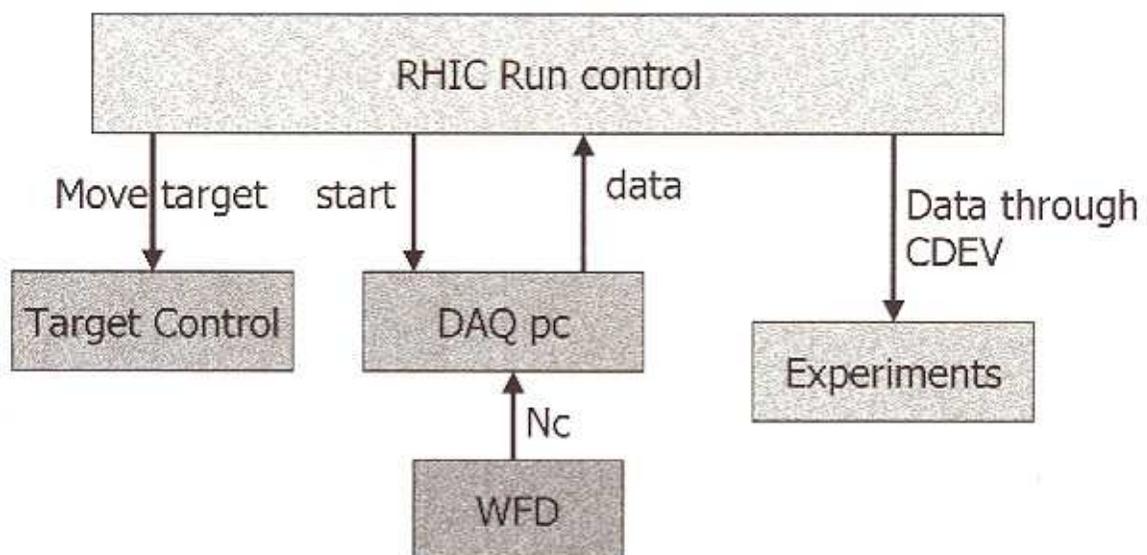
Si Detector Orientation



Si Detector Read Out



RHIC Run Control



Data Collection and Distribution Procedure

- 1, Command in PET page initiate a run
- 2, Move the target in
- 3, Send command to the DAQ pc to take data (or diagnosis mode)
- 4, DAQ pc collects carbon counts and process them and ships out all info to the controller
- 5, Controller distribute the data to experiments through CDEV
- 6, Move the target out

Criteria of the data format

- 1, Provides sufficient information for all experiments.
- 2, Detail enough to spot problems by many people.
- 3, Do not allow different results from the same data set. (everybody has to use the same formula agreed upon)
- 4, Ready to use.
- 5, Upgrade should be transparent

Proposed Information for distribution

- 1, run ID ; Fill ID+ y/b+ seq.#
- 2, time stamp ; begin and end time
- 3, version #'s ; DAQ version +cut id
- 4, Beam Energy ; dipole current
- 5, target ; target ID + position
- 6, Quality bit(s) ; O.K. or not

Continued

- 7, Total, up,down and unpol carbon counts
- 8, Carbon counts per Si per bucket
6x360 integers
(-t integration range by polarimeter crew)
- 9, average asymmetry
asymmetry size \pm error, ang. \pm error
- 10, bunch by bunch asymmetry
2x2x360 floats
(taking pair with unpol. bunch or non-square root method?)

Bunch by bunch polarization

- 1, Using one un-polarized bunch
 - In case of pol. Bunch pair

$$N_{LU} = \sigma_0(1 + P A_N) A_L L_U$$

$$N_{LD} = \sigma_0(1 - P A_N) A_L L_D$$

$$N_{RU} = \sigma_0(1 - P A_N) A_R L_U$$

$$N_{RD} = \sigma_0(1 + P A_N) A_R L_D$$

$$A = \frac{\sqrt{LU}\sqrt{RD} - \sqrt{LD}\sqrt{RU}}{\sqrt{LU}\sqrt{RD} + \sqrt{LD}\sqrt{RU}} = P A_N$$

Continued...

- In case of one un-pol. bunch

$$N_{LU} = \sigma_0(1 + P A_N) A_L L_U$$

$$N_{LD} = \sigma_0 A_L L_D$$

$$N_{RU} = \sigma_0(1 - P A_N) A_R L_U$$

$$N_{RD} = \sigma_0 A_R L_D$$

$$A = \frac{\sqrt{LU}\sqrt{RD} - \sqrt{LD}\sqrt{RU}}{\sqrt{LU}\sqrt{RD} + \sqrt{LD}\sqrt{RU}} = \frac{\sqrt{1 + P A_N} - \sqrt{1 - P A_N}}{\sqrt{1 + P A_N} + \sqrt{1 - P A_N}}$$

$$\approx \frac{1}{2} P A_N \quad (\text{when } P A_N \text{ is small})$$

Continued...

- 2, after knowing stability of A and L, calculate left right asymmetry with corrections.

Issues

- What diagnosis mode and quality check should be used?
- Stable bunch by bunch asymmetry determination method is to be determined.
- What is the procedure to update the data already distributed?