RHIC Polarimeter Data Format

K. Kurita

RHIC Spin Collaboration Meeting
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RIKEN BNL Research Center, Brookhaven National Laboratory

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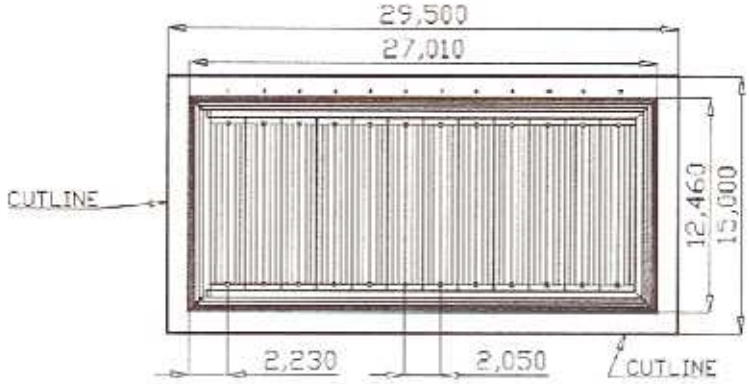
RSC collaboration meeting
Oct. 1, 2001
Kazu Kurita (RBRC)

Outline

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

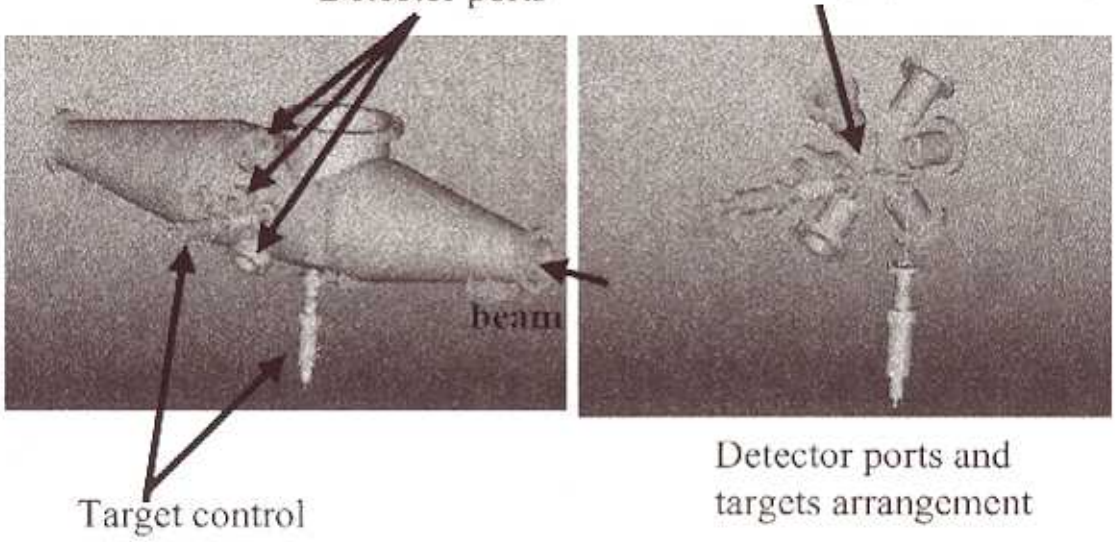
Si design

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



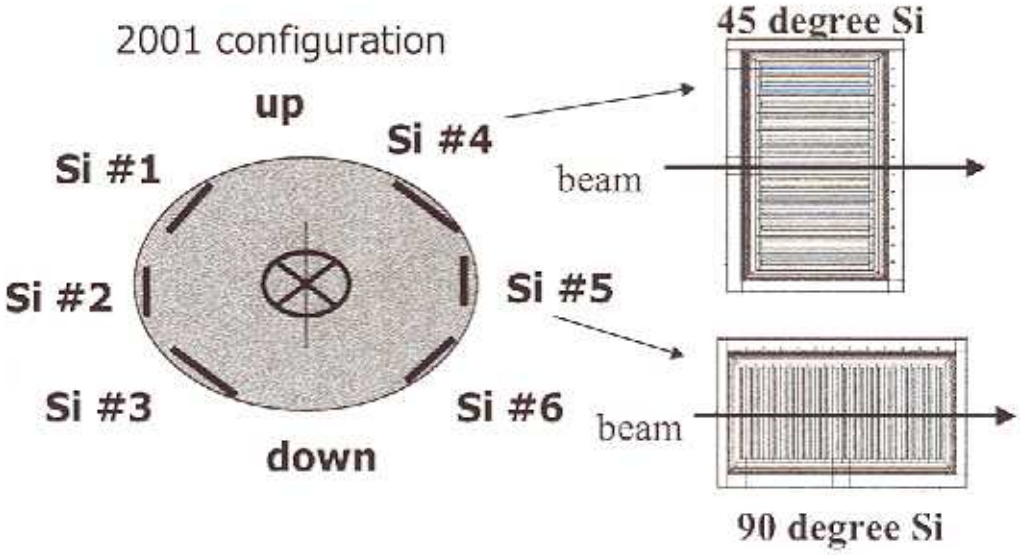
Chamber Design

(George Mahler)

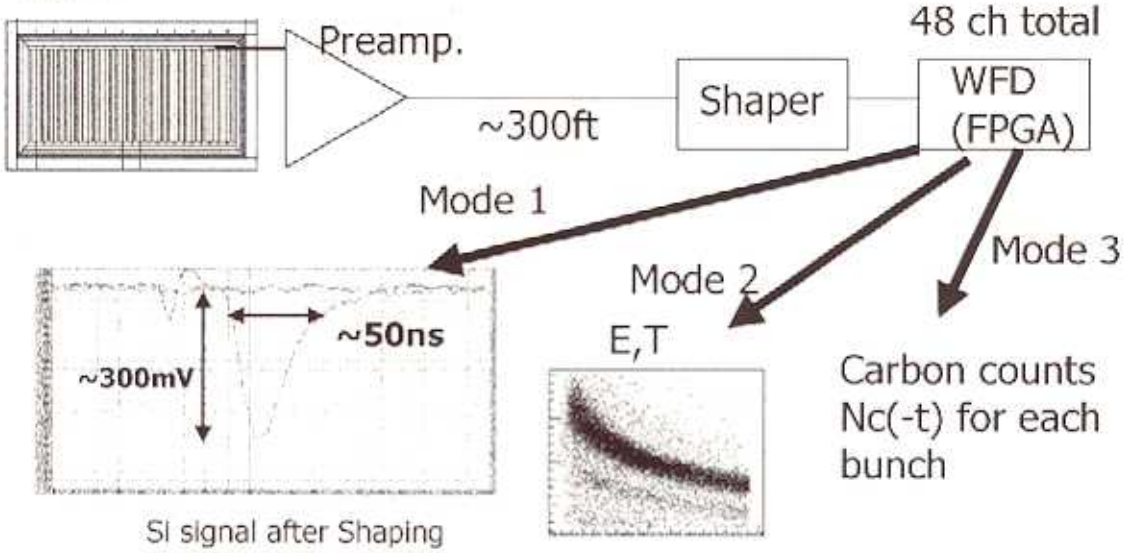


Si Detector Orientation

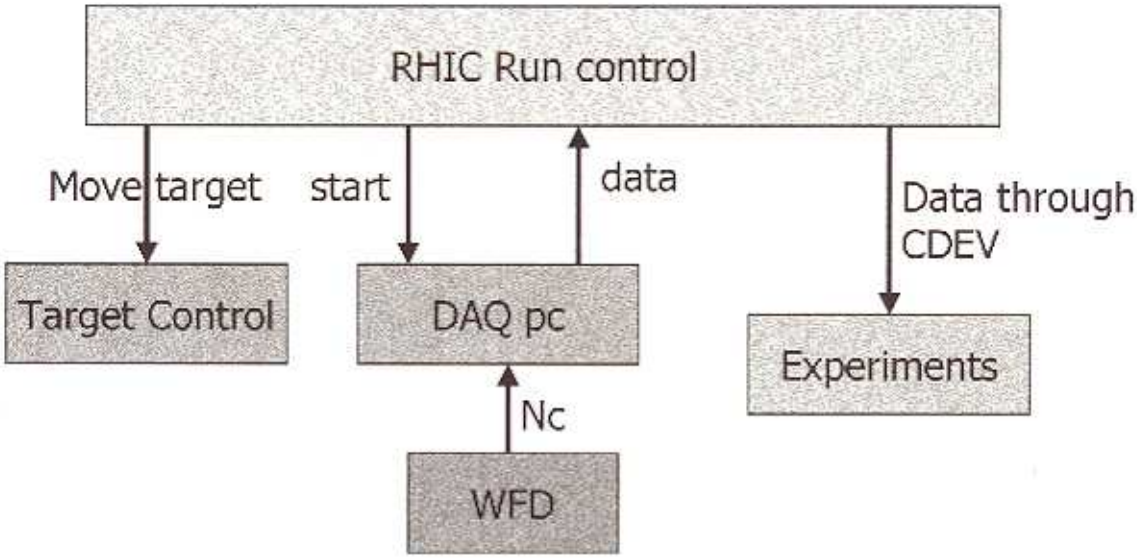
2001 configuration



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 ±error, ang.±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

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

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

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

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

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

Continued…

- In case of one un-pol. bunch

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

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

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

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

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

$\approx \frac{1}{2}PA_N$ (when PAn 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?