pp2pp Running Plan for Year-2 (2003)

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for

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Elastic and Total Cross-Section Measurements in Polarized Proton-Proton Scattering

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For the pp2pp Collaboration

Outline of the Talk

1. Short Introduction
2. Summary of Year-1 Run
3. Plan for Run in 2003

pp2pp Physics Programme

Primary Goal:

Study of total and elastic cross-sections in polarized proton-proton scattering over a large kinematic range

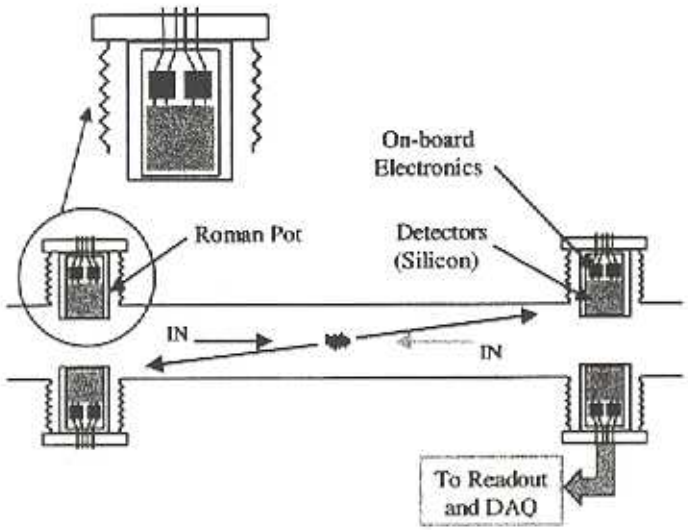
$$50 \leq \sqrt{s} \leq 500 \text{ GeV}/c$$

$$4 \cdot 10^{-4} \leq |t| \leq 1.5 \text{ (GeV}/c)^2$$

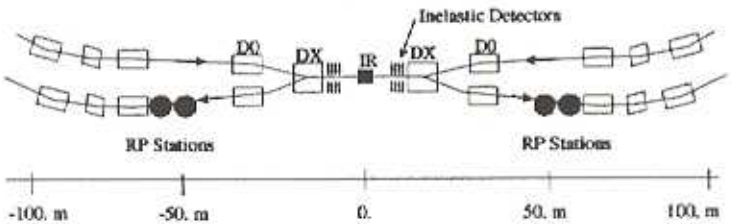
Measure

- Kinematic dependence of σ_{tot} and $d\sigma_{el} / dt$
- s dependence of nuclear slope parameter, b
- Ratio of real to imaginary part of forward scattering amplitude, ρ
- Spin asymmetries A_N, A_{NN}, A_{LL}

pp2pp Detectors in Year-1 (2002)

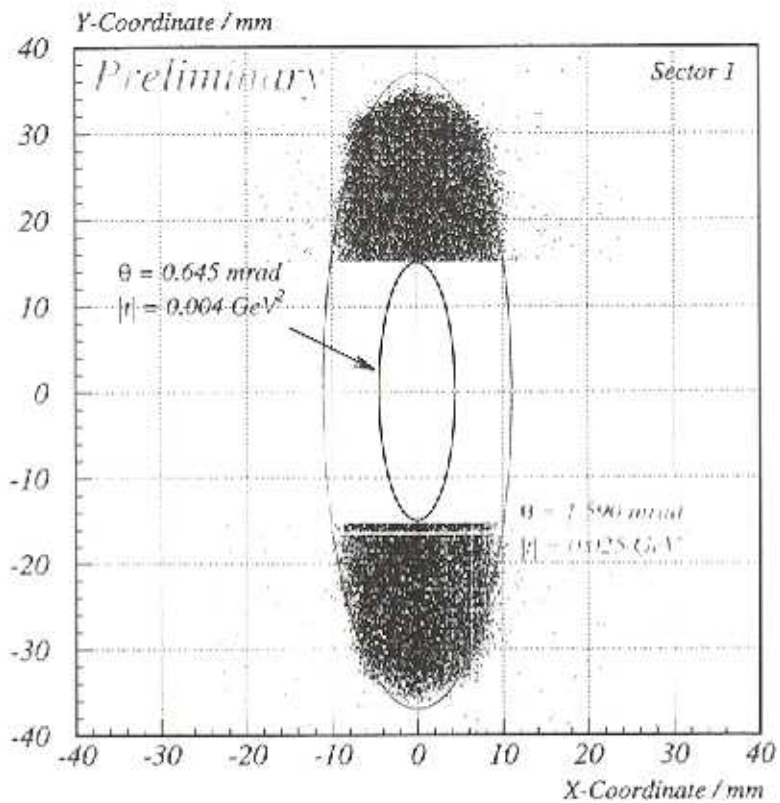


RHIC Intersection Region with PP2PP Basic CB Setup



Conditions during Run in Year-1 (2002)

- 4 Roman Pots total equipped, each with
  - 2 X silicon microstrip detectors
  - 2 Y silicon microstrip detectors
  - 1 trigger scintillator (8 mm thick)
- 15 mm proximity of first detector strip to beam covering $4 \cdot 10^{-3} \leq |t| \leq 0.03\ (\mathrm{GeV}/c)^2$
- 4 planes of inelastic scintillator counters on either side of the IP (covering $2.4 < |\eta| < 5.3$)
- Average beam intensity of $4.4 \cdot 10^{11}$ protons in either ring with 55 bunches $\Rightarrow$ $L \approx 1.2 \cdot 10^{28}\ \mathrm{cm}^{-2}\ \mathrm{sec}^{-1}$
- Special tune of $\beta^* = 10$ m
- Beam emittance reduced to about 12 π mm · mrad via scrapping
- Collected about 400,000 elastic triggers



Plan for Run in Year-2 (2003)

- Replace silicon detectors to improve efficiency and coverage
- Have 4 fully equipped Roman Pot Stations
- Reduce minimum distance of detectors from beam to reach lower t_{min} increasing coverage to $2\text{-}3\cdot10^{-3} \leq |t| \leq 0.03\ (\mathrm{GeV}/c)^2$
- Increase maximum allowed intensity to ~10^{12} protons per beam (safety issue) ?
- Include Van-der-Meer scans for luminosity determination
- Collect about 2-3 million elastic triggers to reduce statistical error
- Achieve accuracy $\delta A_N \approx 0.002$ and $\Delta\sigma_{tot} \approx 3\%$
- Need 1 day commissioning and 2-3 days for data taking (depending on beam efficiency, 50% ?)