The Big Picture: How the G_{En} Experiment Will Run!

Bodo Reitz @ G_{En} Collaboration Meeting, Jlab May 2003

- a scenario for the timeline of E02-013
- kinematics and setup for production data taking
- kinematics and setup for commissioning E02-013
- commissioning of BigBite & N-160 prior to E02-013:
  N-20 tests, BB rate tests, N-160 cosmics, SRC,
  BB Gen detector stack

The Big Picture:

A scenario of the timeline for E02-013

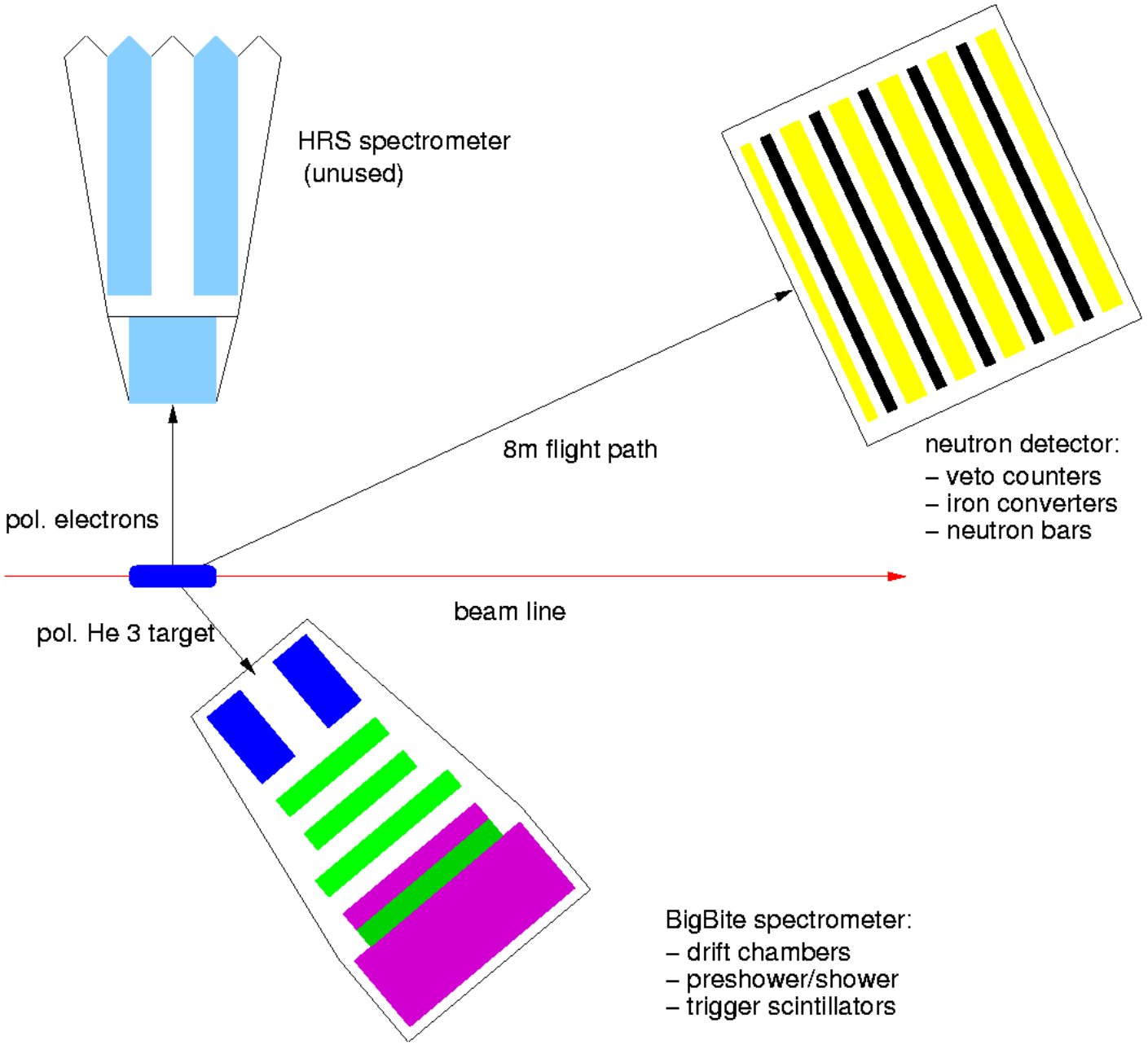
- Fall 2004: E02-013 takes production data
- October 2004: E02-013 gets beam
- September 2004: Installation in the Hall
  (target, neutron detector N-160 and BigBite are ready)
- October 2003: E02-013 passes readiness review
- May 2003: E02-013 collaboration meeting

Production Running

- three kinematic settings:

Q^2 $(\mathrm{GeV/c})^2$	E_i GeV	θ_e deg	p_e GeV/c	θ_n deg	p_n GeV/c	T_n GeV
1.31	1.644	54.6	0.95	35.2	1.34	0.70
2.40	2.444	54.6	1.17	28.3	2.01	1.28
3.40	3.244	50.6	1.43	25.4	2.58	1.81

- 32 PAC-days beam time, majority for last kinematic
- we need BigBite, N-160 and the polarized target
- both HRS parked at backward angles (no space at forward angles)

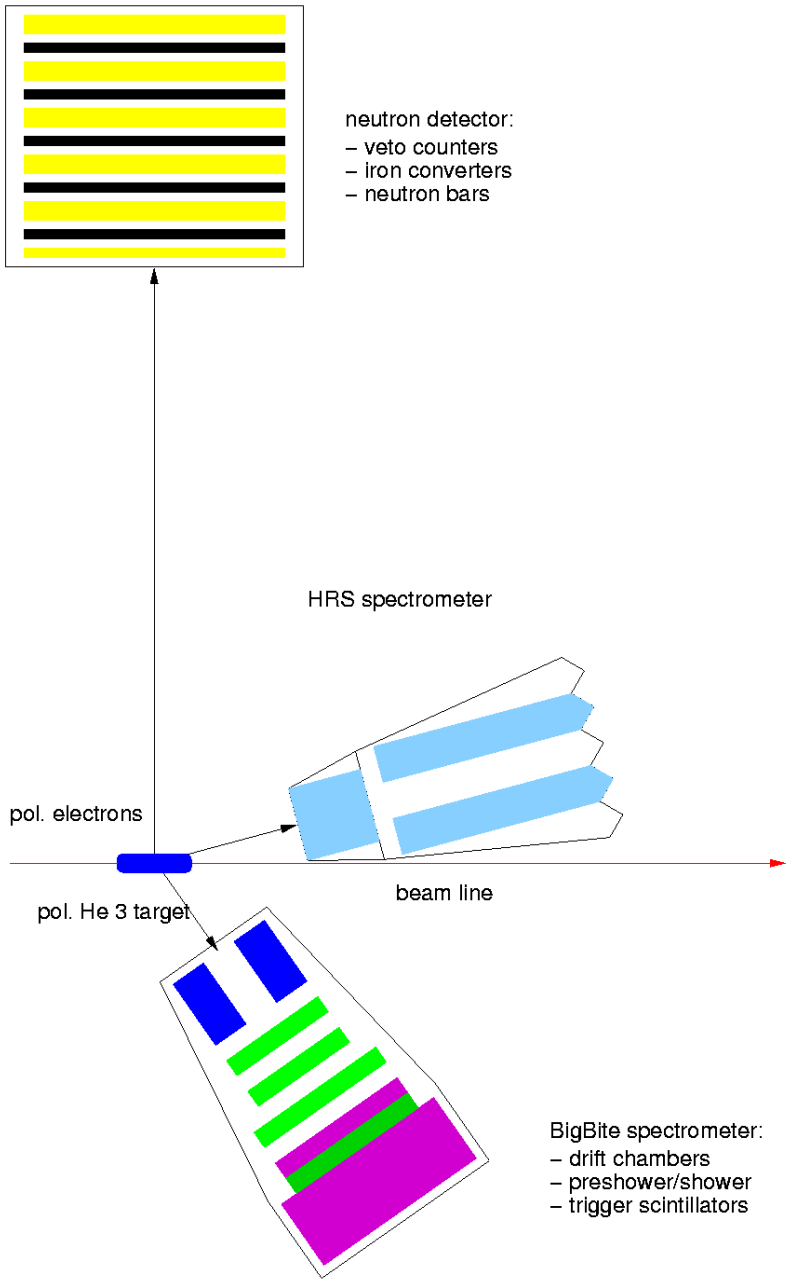

HRS spectrometer
(unused)
8m flight path
neutron detector:
– veto counters
– iron converters
– neutron bars
pol. electrons
beam line
pol. He 3 target
BigBite spectrometer:
– drift chambers
– preshower/shower
– trigger scintillators

Commissioning Setup(s)

- calibration of shower/preshower — BigBite & N-160
- commissioning/calibration of pol. target (Helium-3 elastic scattering) — HRS
- optics commissioning — BigBite (+ HRS?)

challenge:

- exchange of N-160 and HRS during experiment necessary
- N-160 as one piece will be to heavy for crane


neutron detector:
– veto counters
– iron converters
– neutron bars
HRS spectrometer
pol. electrons
beam line
pol. He 3 target
BigBite spectrometer:
– drift chambers
– preshower/shower
– trigger scintillators

Commissioning of BigBite GEN detector stack

- running BB with full GEN detector configuration (3x DC, trigger, preshower/shower) prior to E02-013 in Hall A
- testing of DC under high particle flux
- testing of DC analysis codes
- testing of trigger (scintillator combined with shower)
- alternatives: testing of reduced package
  one or two DCs, no shower/preshower

Commissioning of N-160

- can be done with cosmics, or parasitically in Hall A
- main issue
  - huge number of channels
  - gain matching
  - timing/delays
- reproducibility after dis- and reassembling
- fine tuning at beginning of experiment

The SRC experiment !

- BigBite magnet
- magnetic field at the detectors
- rates in BigBite
- special tests for GEN:
  - BigBite magnet with highest possible current
  - wire chamber in detector stack for rate tests
- neutron detector electronics(½) and DAQ
- neutron arm trigger (parasitically)

BigBite rate tests

- idea:
  - put any drift chamber behind BigBite
  - point BigBite roughly at a target
  - excitation of BigBite magnet can be tiny for the beginning
- purpose: learn about the rates in BigBite
- can and should be done as soon as possible

Neutron Test Setup N-20

- first round of tests is already done
- next round: achieving the same time resolution for the full setup as we already have reached for individual bars
  - this can already be done with cosmic
- tests with beam (during facility development time)
  - coincidence with HRS to optimize timing
  - testing rate reduction by collimating windows etc