

Beam Diagnostic Tools

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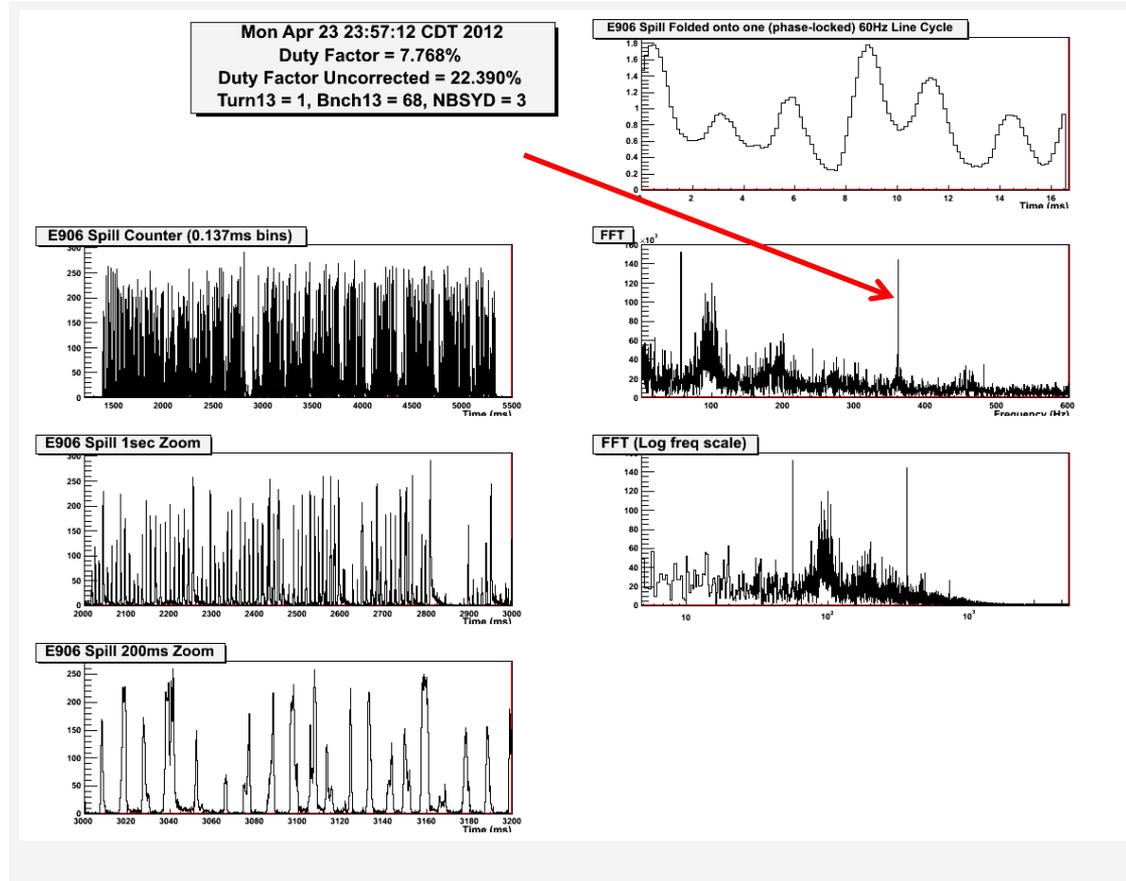
May 17, 2013

Run 1 Review

- Intensity from AD ACNET
 - Ion chamber measurements of #protons/spill
 - Some inconsistencies
 - Should calibrate again using foil activation after beam is reestablished & stable
 - SWIC profiles
 - (Loss monitors)
- Three scintillator telescope looking at interactions in SWIC & Ion chamber just upstream of helium pipe (~15' upstream of targets)
 - Non linear response with increased beam intensity
 - Probably affected by neutrons from FMAG (beam dump)

Run 1 Review (cont)

- Hodoscope rates
 - Scalers read out at 10 kHz
 - FFT posted on web page for AD use
 - Obvious 360 Hz structure
 - Lots of other structure too



Run 1 Review (cont)

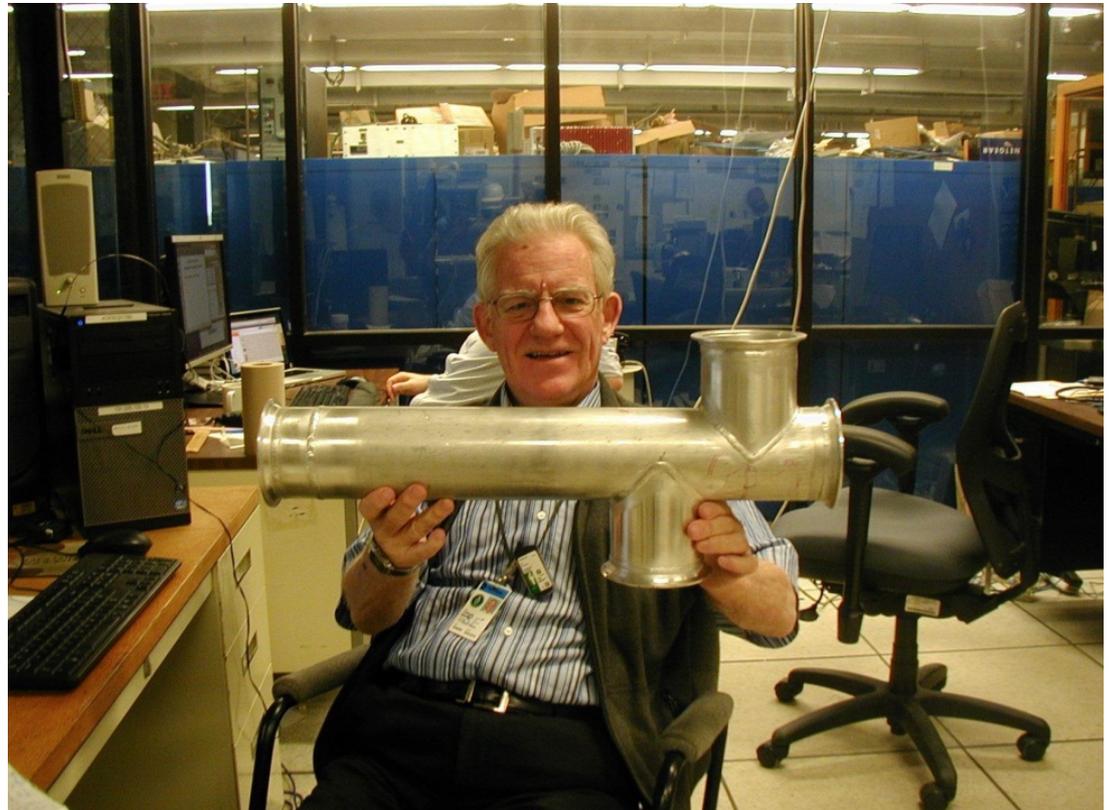
- Quarknet splatblock
 - “multiplicity” input from 1st level V1495 (number in H2T 0-15)
 - Running sum of 8 RF buckets
 - Veto triggers if Sum>Cut (veto if sum crosses threshold after trigger bucket as well as before)
- Deficiencies
 - Not synched to Main Injector RF (20 ns cycle, only ~8RF buckets)
 - 8RF buckets is too short; doesn't cover entire memory time of chambers (St 2 TDC distribution is ~250ns wide = 13 RF buckets)
 - Didn't have a measurement of beam delivered during splatblock
 - Splatblock using spectrometer depends on target – bad for cross section measurements

Run 2 Plan

- Beam Intensity Monitor
 - Cerenkov counter located well upstream (~150')
 - Not sensitive to neutrons
 - Signal should be proportional to beam intensity
 - Instrumented with one phototube
- Read out with new NIM module with QIE10
 - Clocked with Main Injector 53 MHz
 - Signals arrive early enough to allow splatblock based on at least 16 RF buckets after trigger.
 - Will accept DAQ live/dead input & keep track of beam delivered during DAQ live/dead time.

Beam Intensity Monitor Status

- Cerenkov counter will be installed “soon”
- Cables have been pulled.
- Will use Ar/CO₂ as radiator
- 8-stage Phototube & fully transistorized base are in hand



Beam Intensity Monitor Status (cont)

- Readout Electronics Status:
 - PCB schematic finished (as of 5/16)
 - Key parts ordered or in hand
 - QIE10_P4: 1/board – in hand
 - Memory: 2 (16x64 Mbit) – ordered
 - Processor: 1 STM32F405 (ARM Cortex) – in hand
 - FPGA: 1 Cyclone 3 EP3C16 – in hand
 - Ethernet: 3 Wiznet (100 Mbps) – in hand
 - FRAM(*): 1 – ordered

(*) FRAM (or FeRAM) = Ferroelectric RAM; nonvolatile, supports many read/write cycles (unlike Flash memory)

NIM Module Schedule

- Layout complete: 5/30
- PCBs rec'd: 6/17
- Available for 1st tests of readout: 6/2188
 - (should have been 6/21/13!!)