

SMT Status and Performance

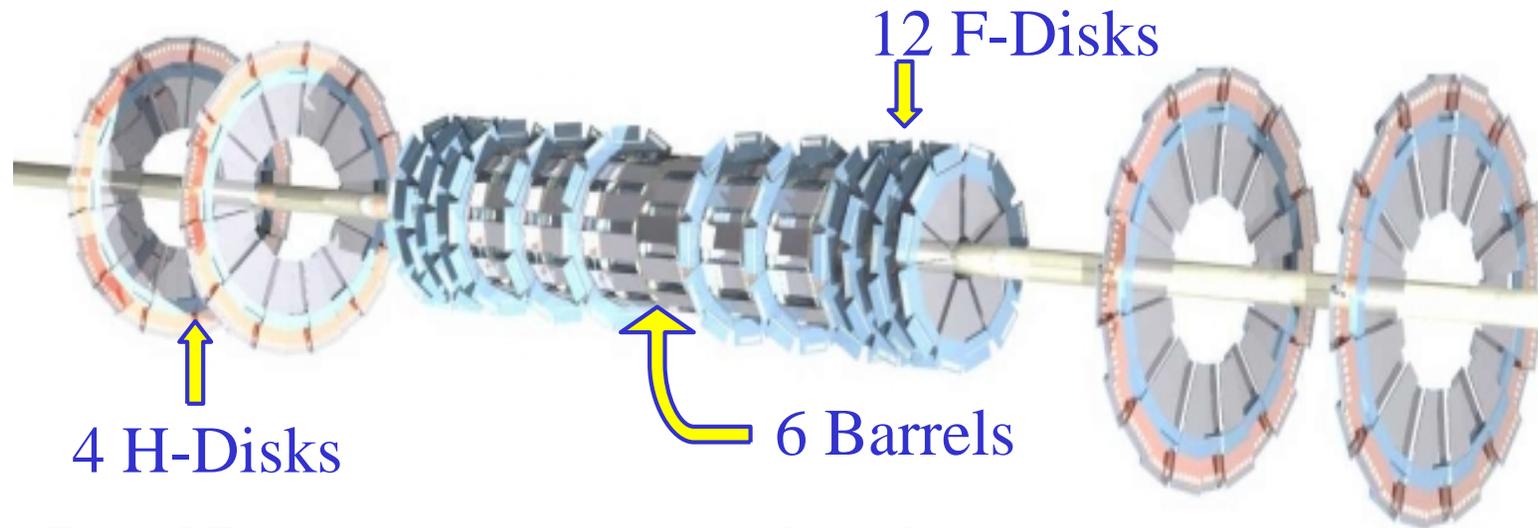


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- / **Introduction**
- / **Water Leak**
- / **HV issues**
- / **SMT Results and Performance**
- / **Summary**



SMT Overview



- ◆ Barrel Detectors measure central tracks
- ◆ Disk Detectors for forward tracking

- ◆ 6 Barrel (each 12cm long) $|z| < 38.4$ cm 2.7 cm $< R < 9.5$ cm
- ◆ 12 F-Disks $|z| < 54.8$ cm 2.6 cm $< R < 10.5$ cm
- ◆ 4 H-Disks $|z| < 120$ cm 9.5 cm $< R < 26$ cm
- ◆ 793.000 readout channels

Percentage of working devices:

Barrel: ~95%, F-disks: ~95%, H-disks: ~87%

- ◆ additional noise problems on F-wedges under investigation

The Water Leak problem

- ♦ access to cathedral area on thursdays (04/11) access
- ♦ water leak was found in **heat exchanger** for one interface board crate

/ Interface Boards

- / 8 Crates (144 Boards in total)
- / Refresh signals and adjust timing
- / SVX monitoring and power supply
- / Biasvoltage-distribution



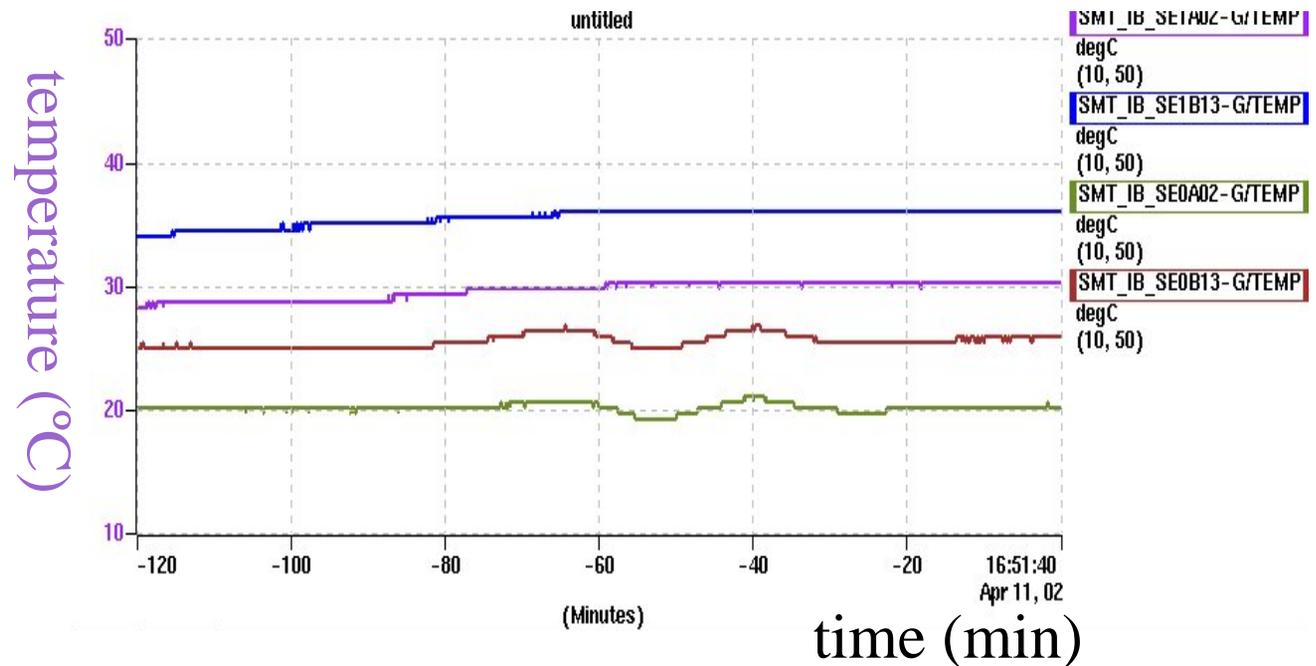
interface board crates BEFORE



- ✦ repair of heat-exchanger possible only by taking crate out (~2-3 days of work in cathedral)
- ✦ decided to disconnect water and run it air-cooled only
- ✦ dissipate 450W
- ✦ hottest spots were around 38 °C

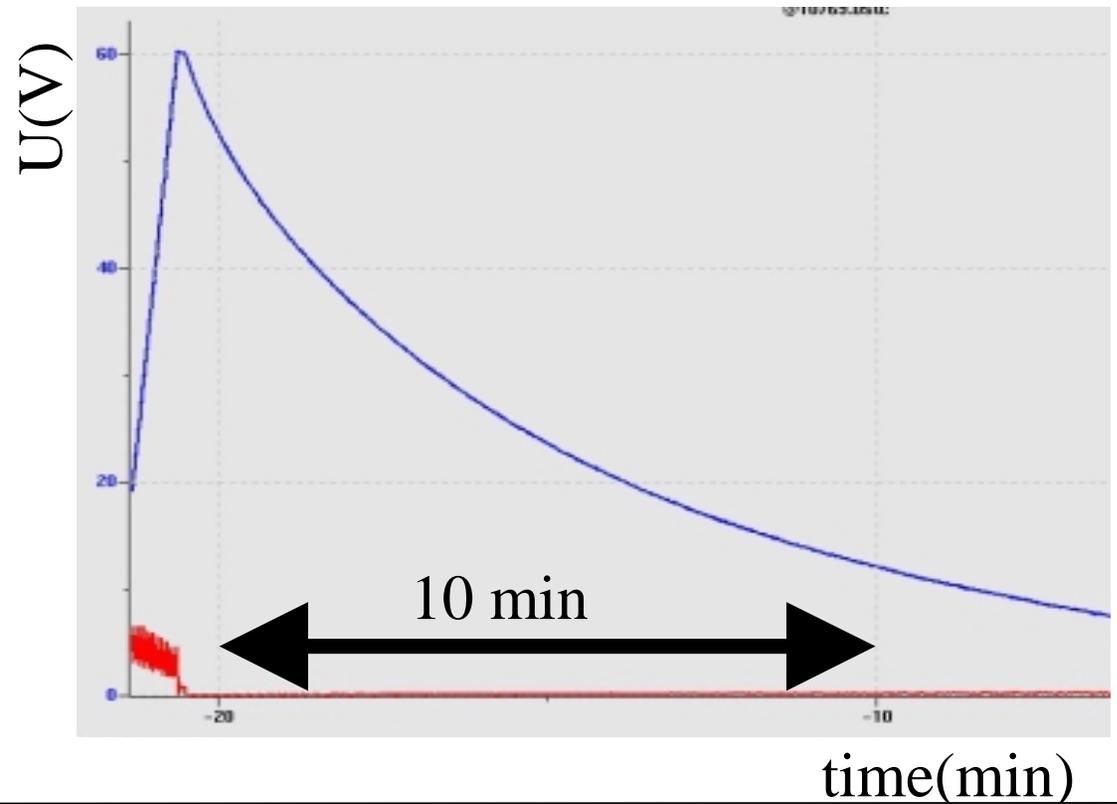
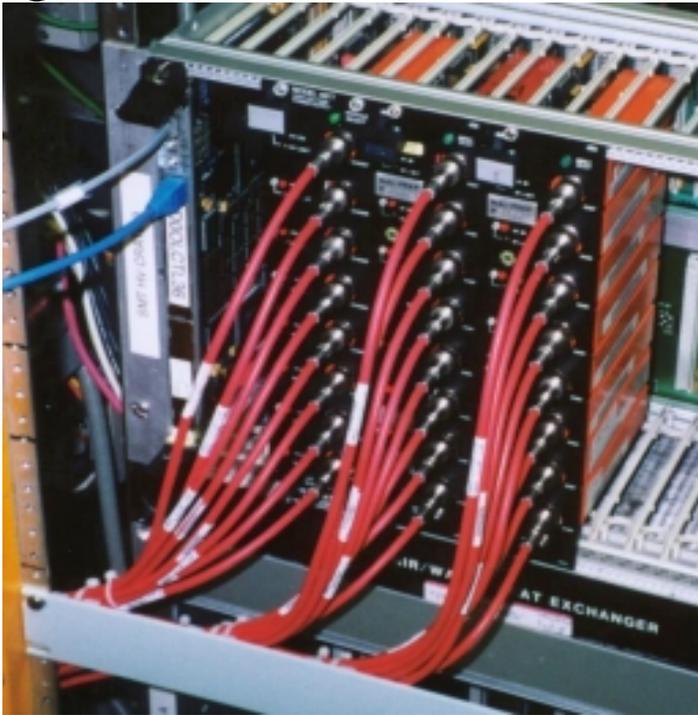
19 26 NW0A02	21 17 NW1A02	18 23 NE0A02	23 20 NE1A02
21 18 NW0B0C	21 18 NW1B0C	21 20 NE0B0C	16 19 NE1B0F
24 19 NW0B0D	20 22 NW1B13	18 20 NE0B13	20 24 NE1B13
22 19 SW0A02	21 18 SW1A02	20 23 SE0A02	29 28 SE1A02
21 18 SW0B0C	20 18 SW1B0C	21 19 SE0B0C	30 26 SE1B0C
23 19 SW0B13	23 19 SW1B13	25 19 SE0B13	35 27 SE1B13

- ✦ crate runs ~10 °C hotter than others
- ✦ stable after closing detector



High Voltage Rampdown

- ♦ long rampdown time for high voltage → **lose beamtime**
- ♦ BiRa 4877 HV modules located in counting house
- ♦ Cockcroft-Walton generators
- ♦ can't sink charge
- ♦ filtering capacitors on bias lines (~few μF)
- ♦ have to discharge over 100M Ω resistor in HV pods → slow rampdown



Solution: Bleeding Resistors

- add additional resistor in parallel to sensors
- ~2-10 M Ω

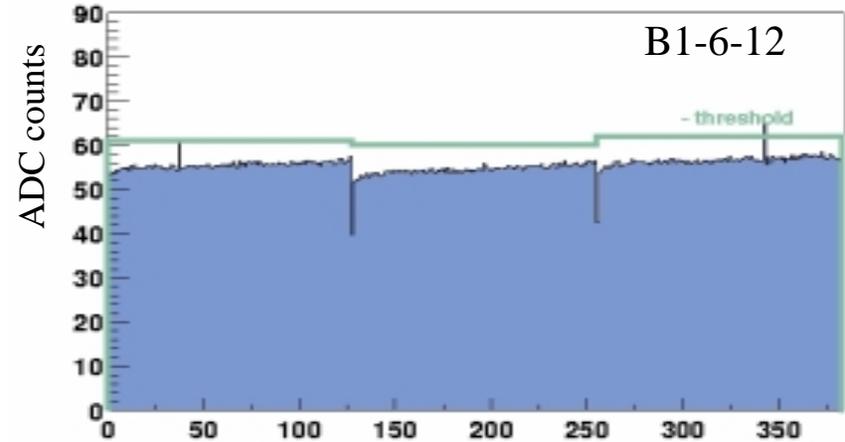


- reduces discharge time
- currently down to 4 minutes, expect 3 minutes by end of the week
- additional current ~10 μ A
- working on modified monitoring to subtract extra current

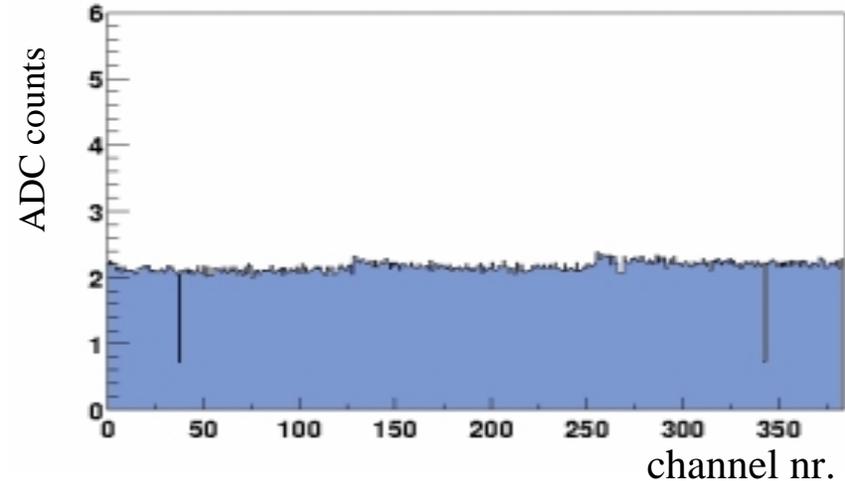
SMT Calibration

- take calibration data during quiet time
- used for:
 - setting chip-wide thresholds for online sparsification
 - offline pedestal subtraction
- calibration runs ~ once per week

Pedestal mean

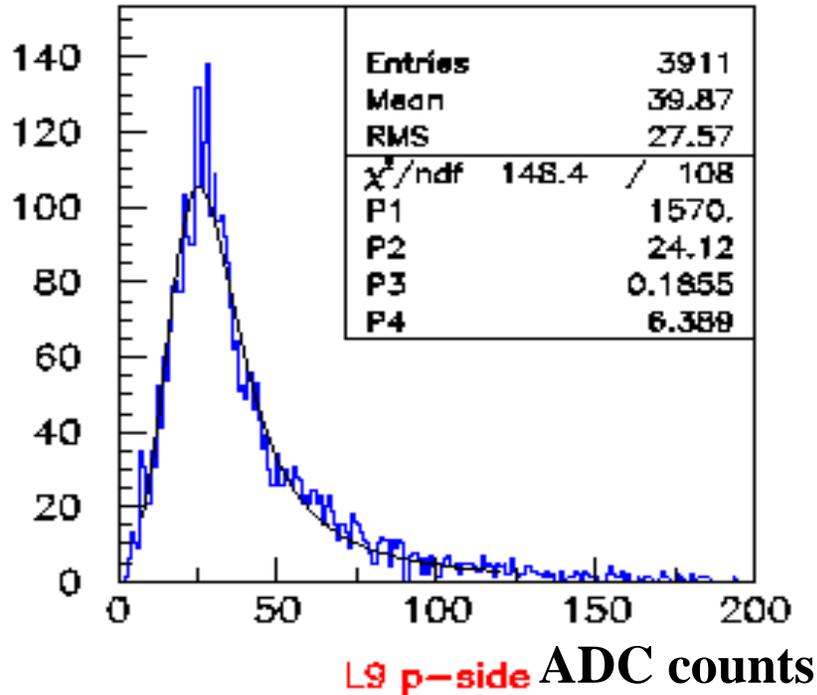


Pedestal width (Noise) channel nr.

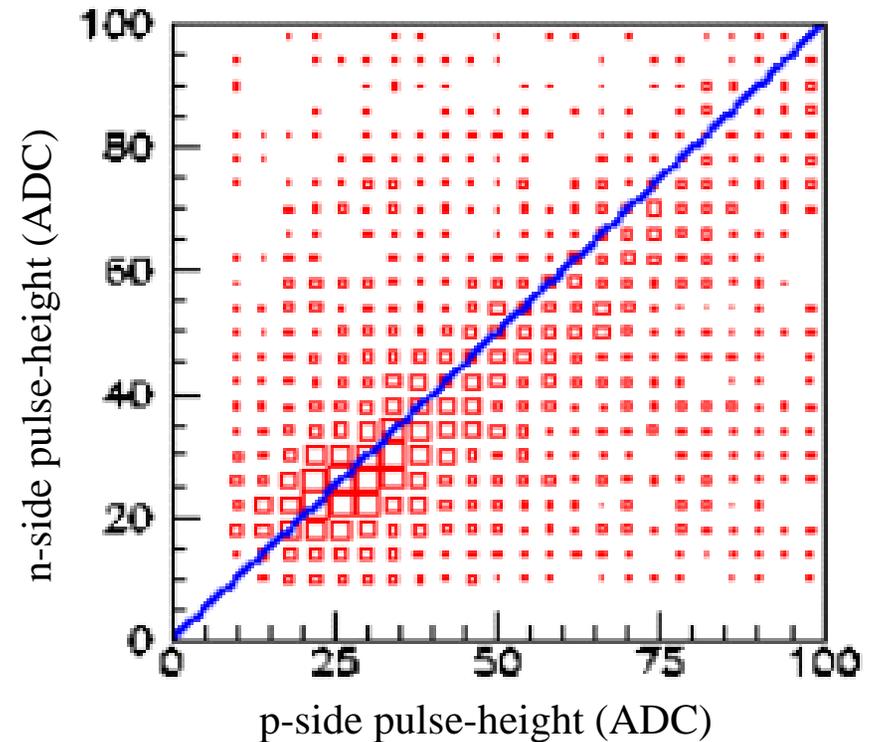


SMT Clusters

1 mip = 4 fC = 25 ADC counts



S/N > 10
as expected!

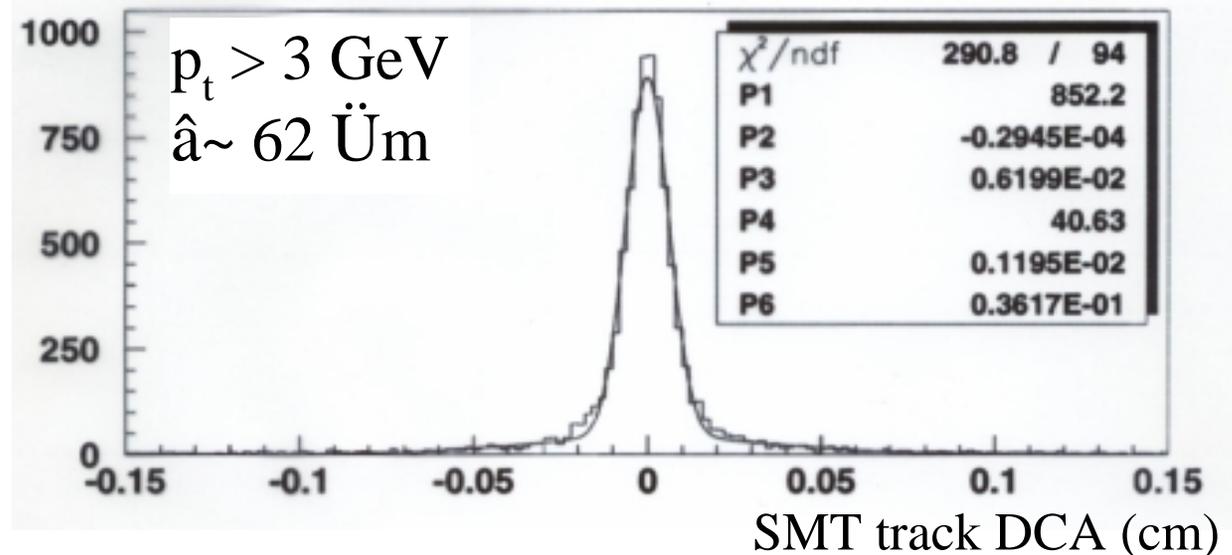
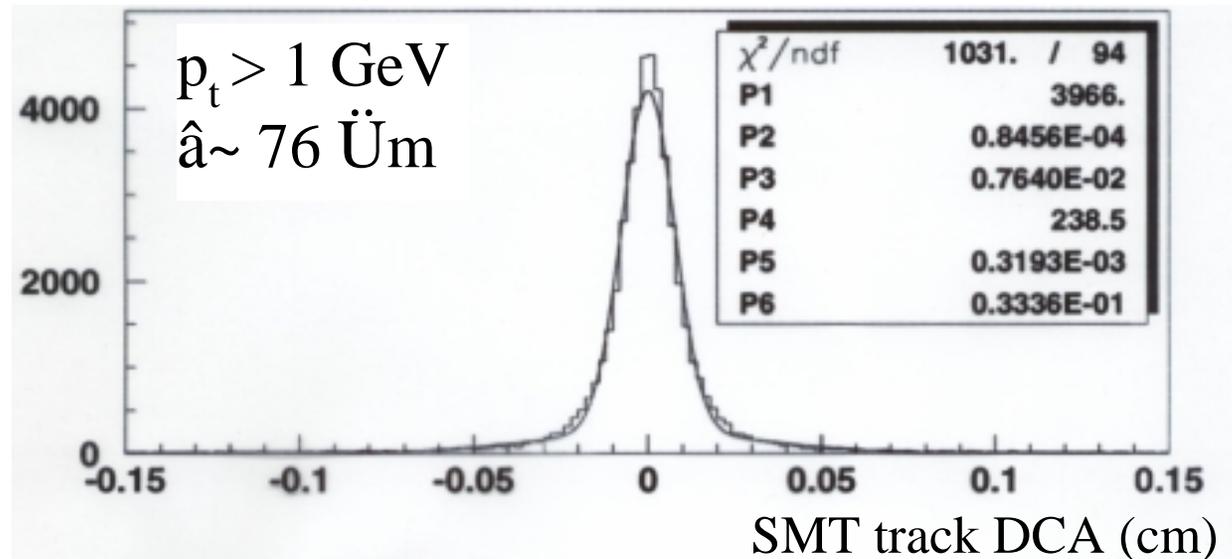


pulse-height correlation
between p- and n-side

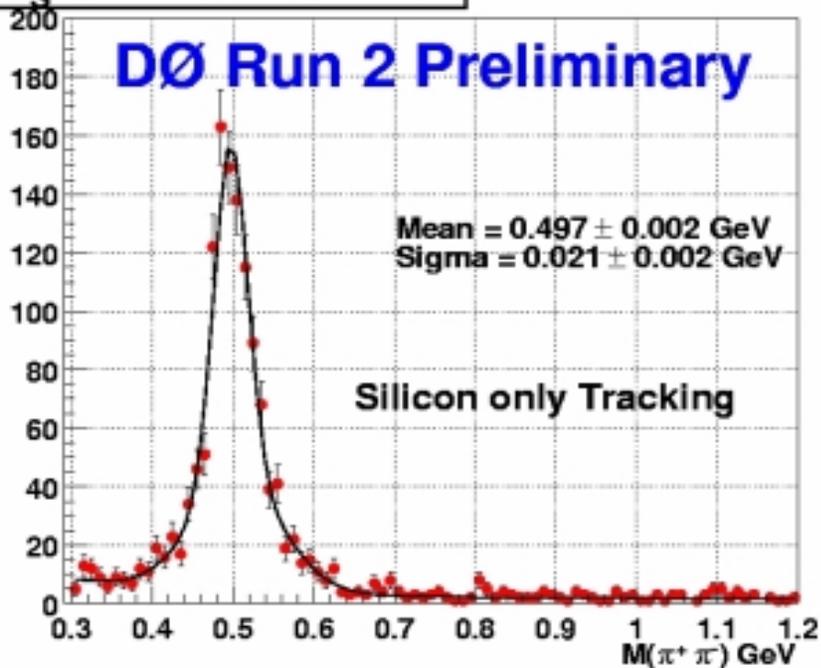
hit efficiency studies underway, look promising

Alignment and DCA resolution

- a lot of efforts on SMT alignment
- necessary for good DCA resolution
- DCA-distributions for SMT stand-alone tracks with newest alignment:



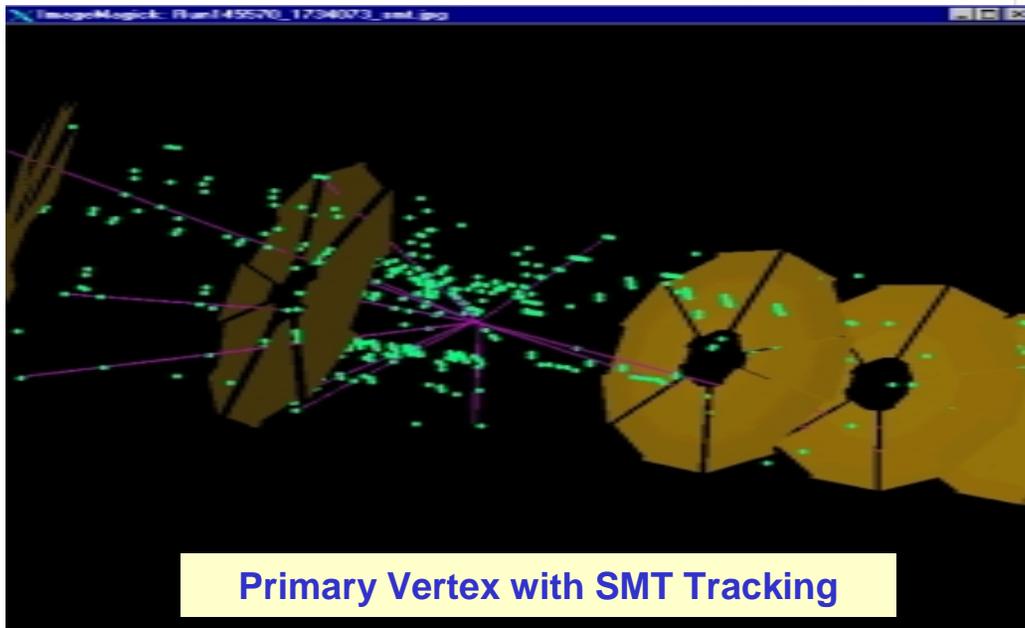
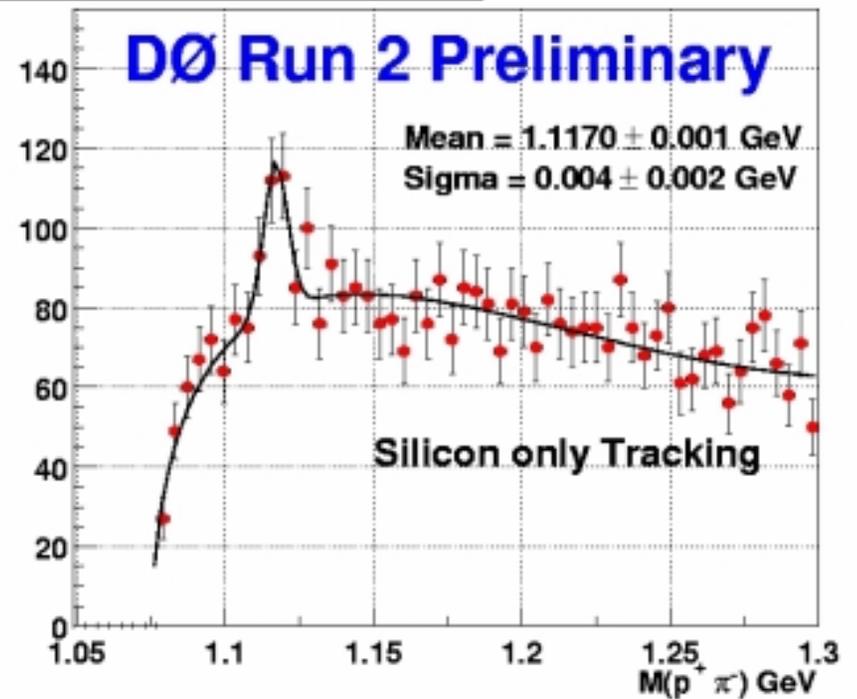
K_S^0 Invariant Mass



SMT results

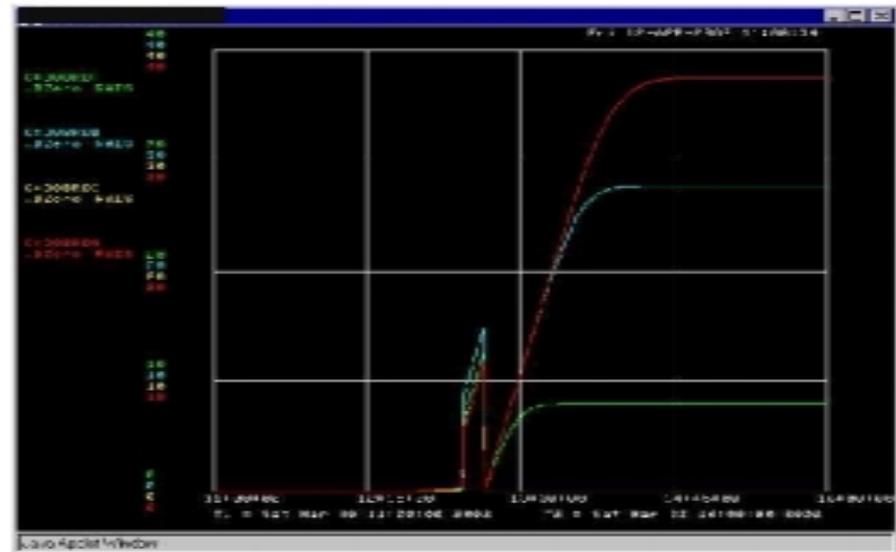
reconstructed with SMT only tracks
explicit V^0 reconstruction

Λ Invariant Mass



Radiation issues

- integrated dose so far:
~10 krad
- SMT is radiation hard to 2 Mrad
- step 13 losses down to
~4-5 rad per shot-setup
- March 30th:
~0.08 rad in ~5 min
- SMT is running unbiased but with
low voltage on during shot-setup
and beam studies



Summary

• **Commissioning/Operation**

- approx. 93% of all channels can be read out
- used thursday's access to fix water leak by disconnecting defective heat exchanger
- affected crate can be powered and used air-cooled only
- working on reduction of HV rampdown time

• **Results**

- Calibration, Resolution and Alignment studies look promising
- Studies regarding noise, clustering, efficiency and track-reconstruction are ongoing