News from the NA60 Silicon Pixel Telescope

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PHENIX Detector Council Upgrades Meeting, March 15, 2002

- **NA60 Experiment + Pixel Vertex Spectrometer**
- **Preparations for the Summer 2002 run**
- **First experience with the pixel prototype plane**
- **PHENIX specific R&D aspects**

NA60 Experiment

"Study of prompt dimuon and charm production with Proton and Heavy Ion Beams at the CERN SPS"

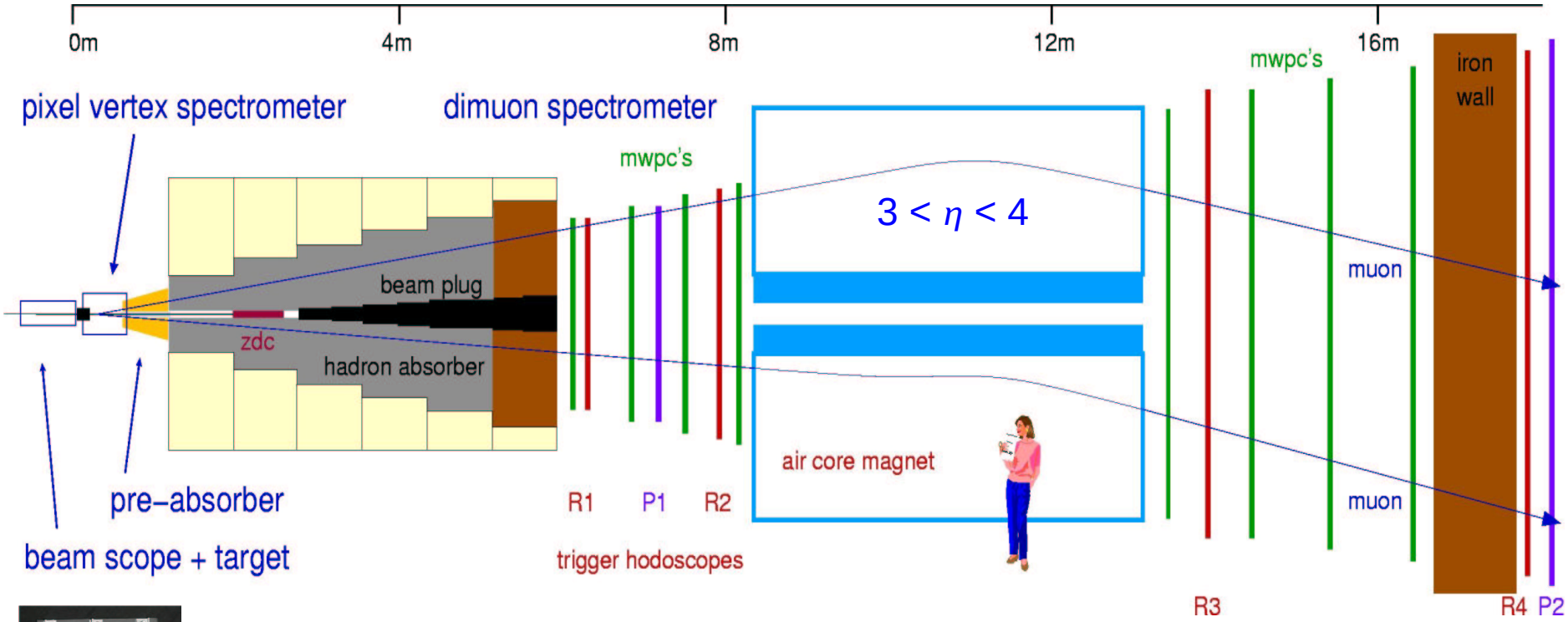
NA50 muon spectrometer + radiation tolerant silicon vertex tracker of high granularity operating in a magnetic field

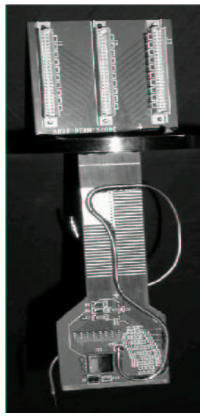
* track all charged particles in vertex spectrometer
* measure angles, momenta, impact wrt. interaction point
* match to the muons which crossed the hadron absorber

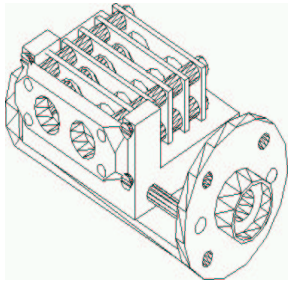
→ **event samples with pronounced / very small impact parameters**

details on the current status:

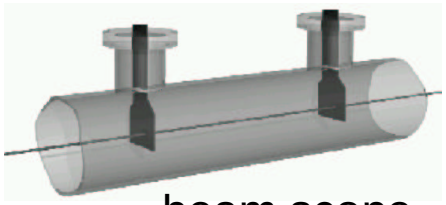
NA60 experiment status report: CERN/ SPSC 2002−009
Status of silicon pixel telescope: NA60 Note 2002−3



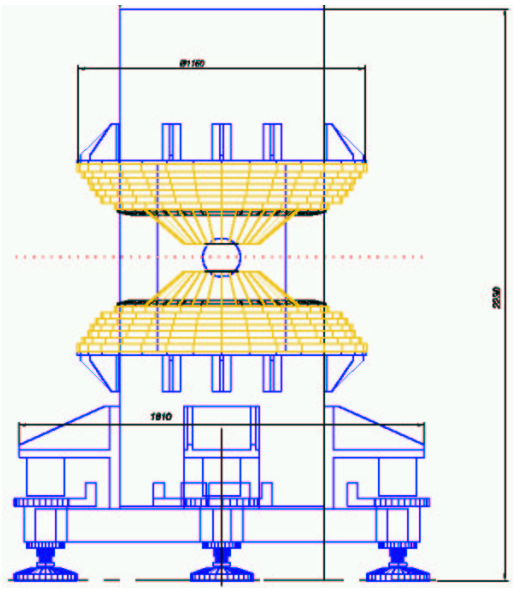




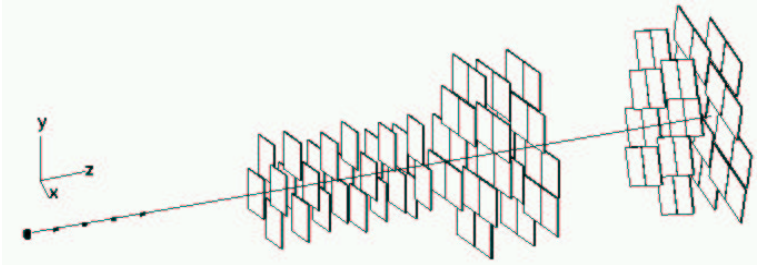
target holder



beam scope



dipole magnet



14 pixel detector planes

NA60 Vertex Spectrometer Preparations

For 1st physics run ("protons") in May/June 2002:

- build and install full silicon micro strips telescope, with NA60 specific sensors provided by BNL instrumentation group;
  physics measurements with this strips telescope
- build the first small pixel plane, using all resources available to NA60 at CERN
  (collaboration with ALICE, availabilities of workshops and support groups):

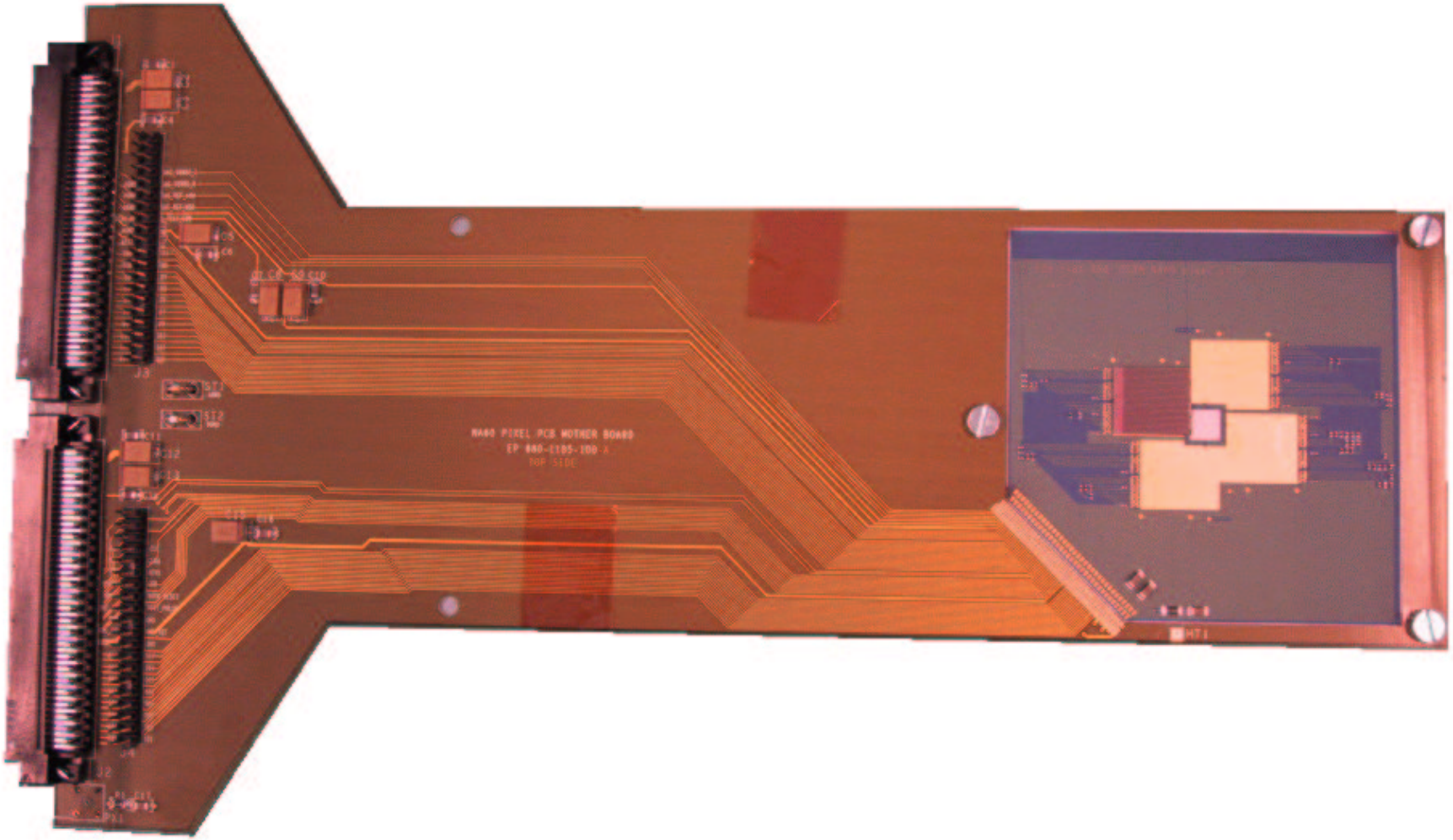
a) electrical prototype: verify concept, study cooling system, finalize design of the large planes **significant progress + first results**

b) fully operational module: characterization in beam, participate in NA60 data taking for the last week or last days of the run.

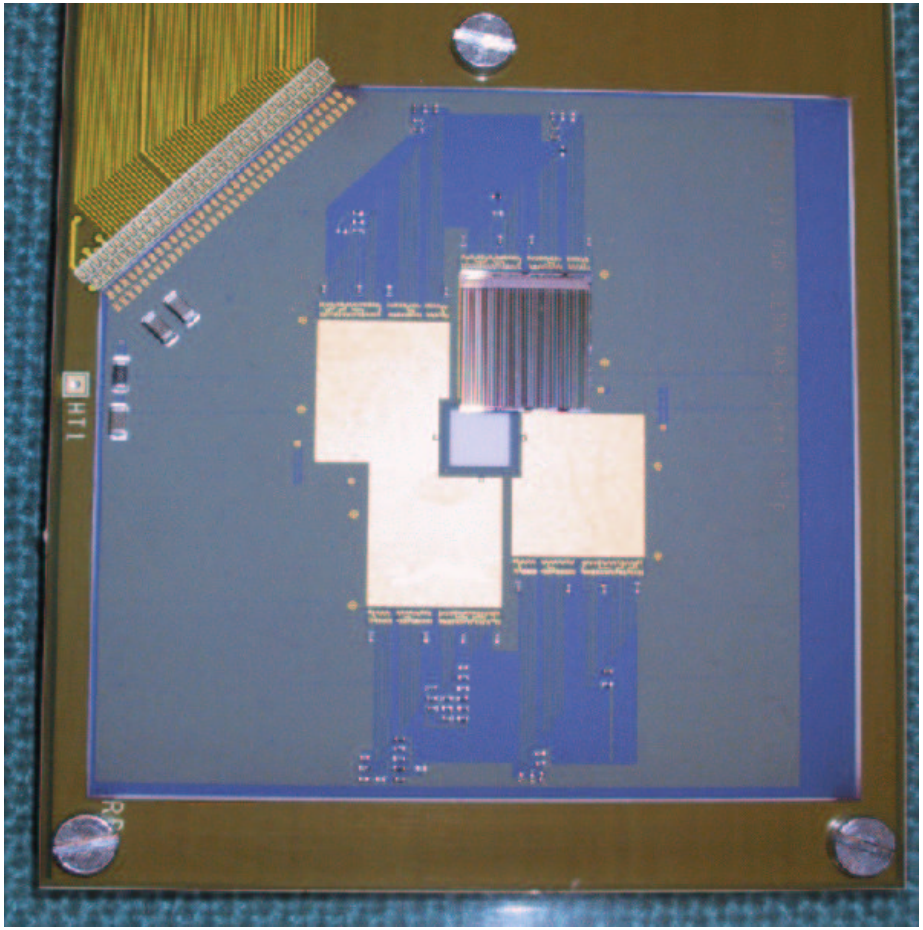
For 2nd physics run ("heavy ions") in October 2002:

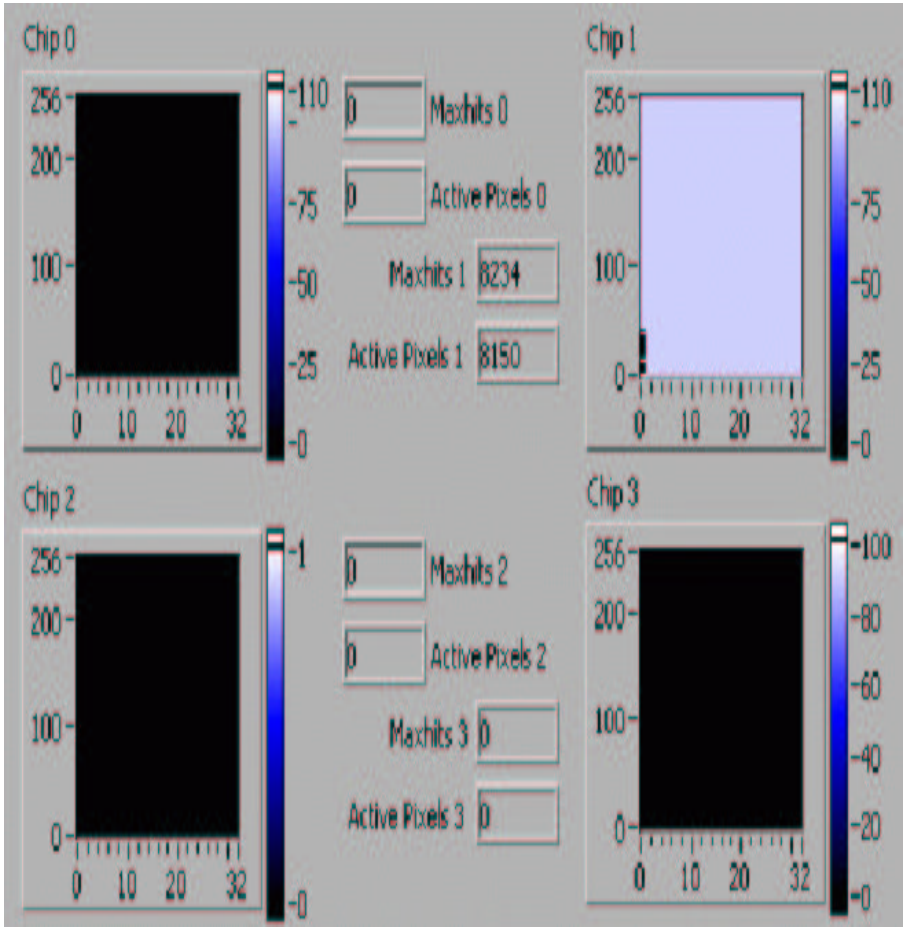
- replace silicon strips telescope with silicon pixels.

The electrical prototype pixel plane

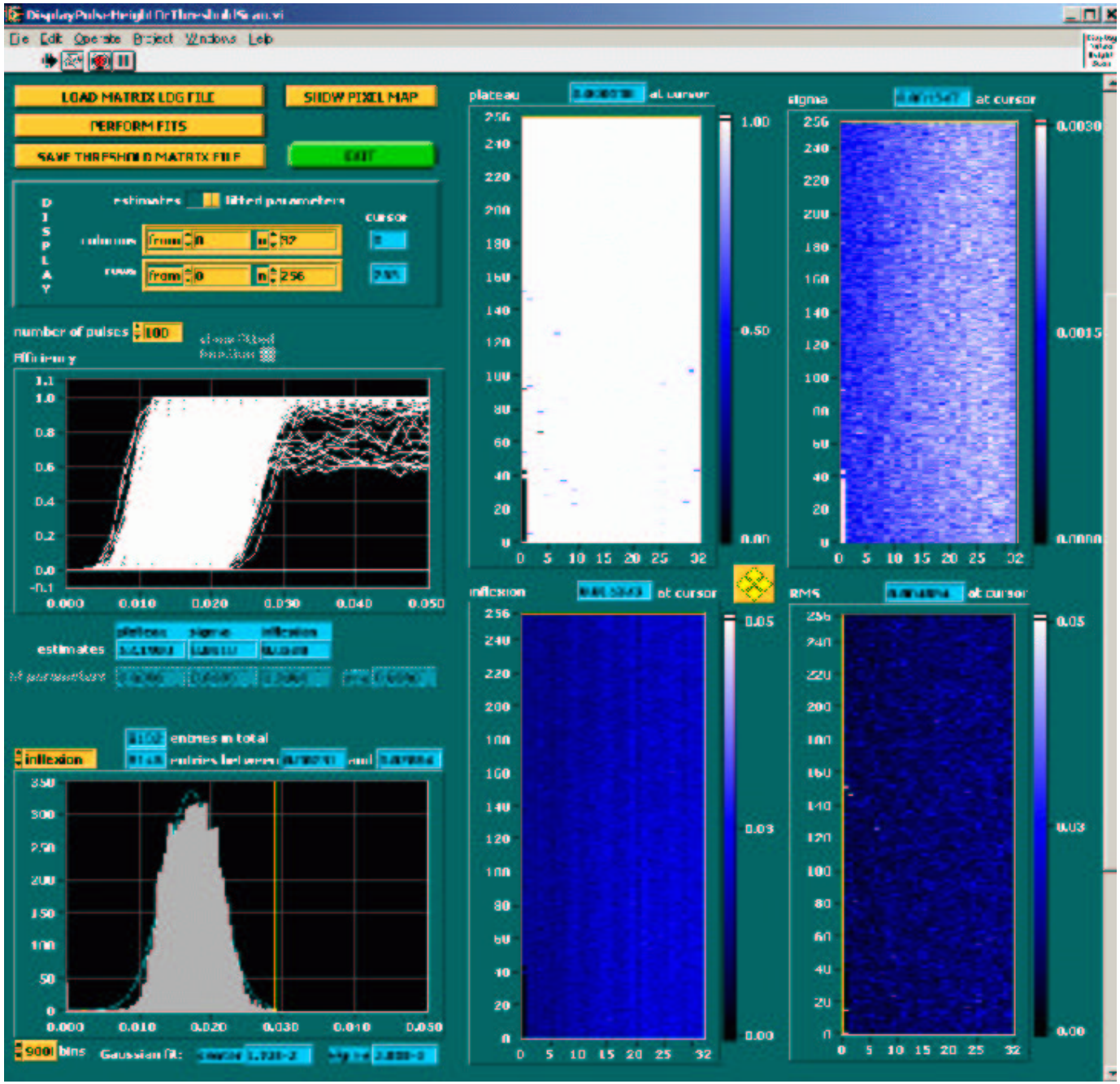


Operation of the first chip on the hybrid





Readout with the full chain of the control and acquisition system.



Threshold and noise measurement

All controls and readout are fully functional.

Electrical properties are nominal:

e.g. thresholds

~ 1150 e^-,

~ 250 e^- rms

NA60 pixel detector: module thickness

- ceramic chip carrier: 300 μm ceramic Al_2O_3
  + 160 μm bus 8 μm gold/ 30 μm polyimide layers
- readout chips: presently: 750 μm
  being investigated: short−term availability of 300 μm chips
- detectors: 300 μm and 200 μm

→ total thickness: max. (0.46 + 0.75 + 0.3) mm = 1.5 mm
min. (0.46 + 0.3 +0. 2) mm = 0.96 mm

Bump−bonding of thinned readout chips is now being negotiated by ALICE/VTT.
Commercially available at VTT: technology to handle >150 μm chips for bump−bonding.
Results can be expected on ~ 1 year time scale. NA60 will certainly have access to thinned detector assemblies.

R&D towards an application of CERN pixels in PHENIX

Work on a PHENIX pixel detector prototype, building on the ALICE/LHCb pixel chip(s):

- **detector module:**
  what size+ thickness, what bus, how and where to arrange in PHENIX vertex spectrometer

- **mechanics:**
  physics simulations $\leftrightarrow$ engineering

- **readout electronics:**
  interface NA60 Pixel Readout Board (PRB+PCI) to PHENIX readout (PRB+FEM+DCM).

Try to place PHENIX prototype modules in NA60 (run 2003?).