STAR – FTPC
Project report

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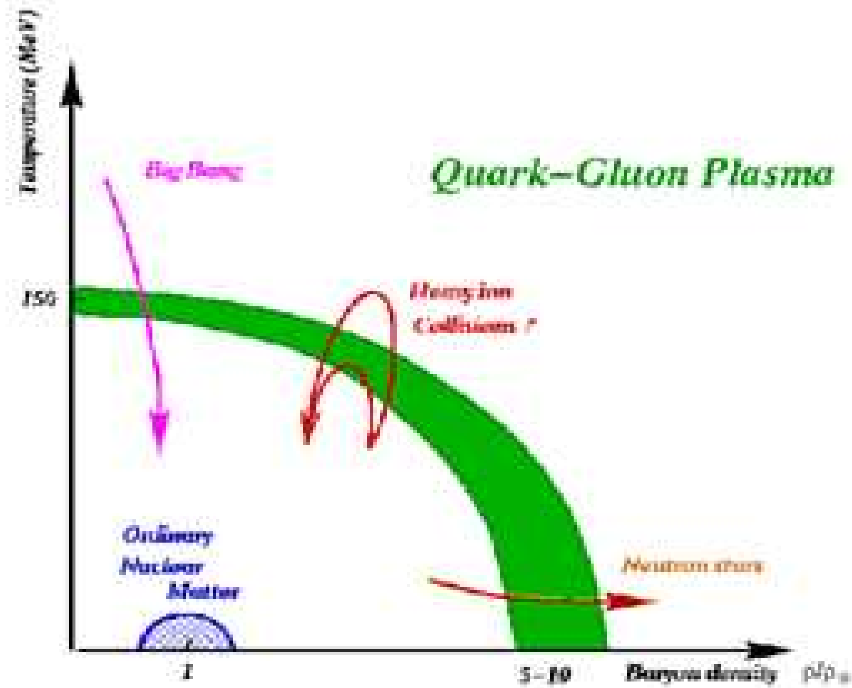
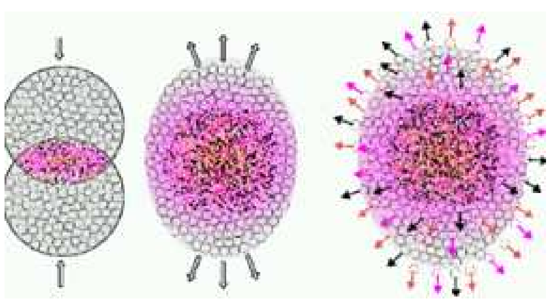
OUTLINE

- The physics of STAR
- The collider
- STAR
- The FTPC
- Tests
- Software
- Schedule
- Manpower & budget

Purpose of STAR

- Examine the QCD predictions of deconfinment and chiral phase transitions.
- Study the equation of state of hadronic matter.





t=0 t=1 fm/c t=3–>??? fm/c

- Assess the thermodynamic properties of the system .
- Measure the hadronic observables emerging from interactions of relativistic heavy nuclei.

RHIC
Relativistic Heavy Ion Collider

Au –> Au

E_{Top} =100 GeV*A/c

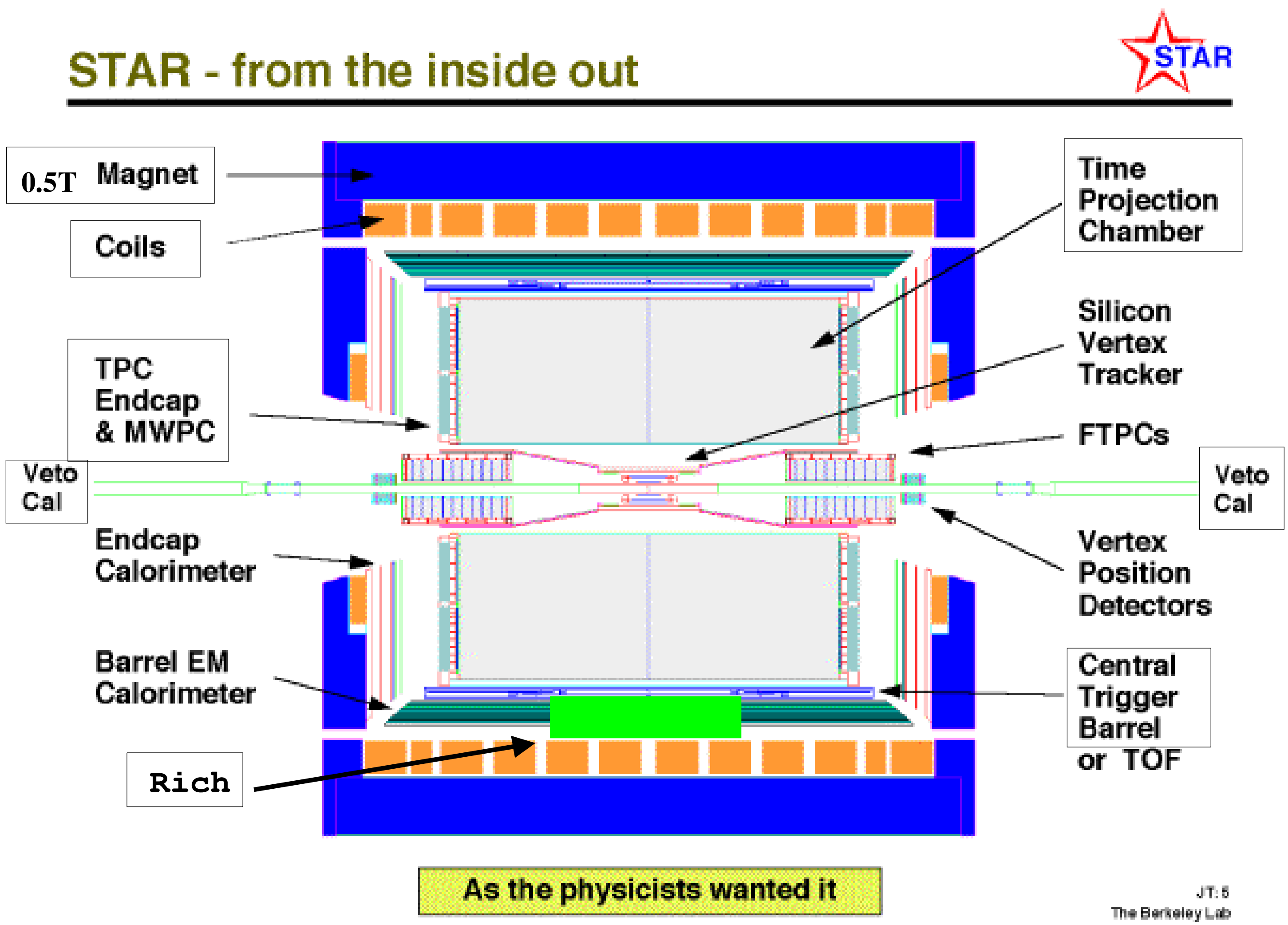
L=2*10^26 /(cm^2*s)

Diamond RMS=18cm

10 hours lifetime.

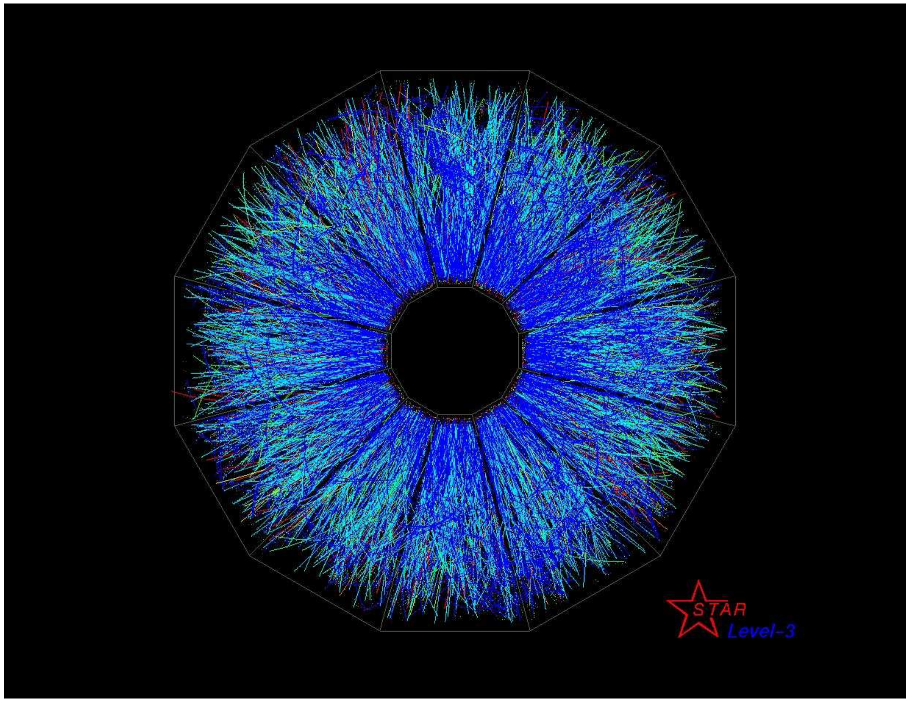
Au beam energy 65 GeV*A/c;
10% design luminosity reached;
Diamond RMS: 70 cm;
Lifetime: 5 hours.

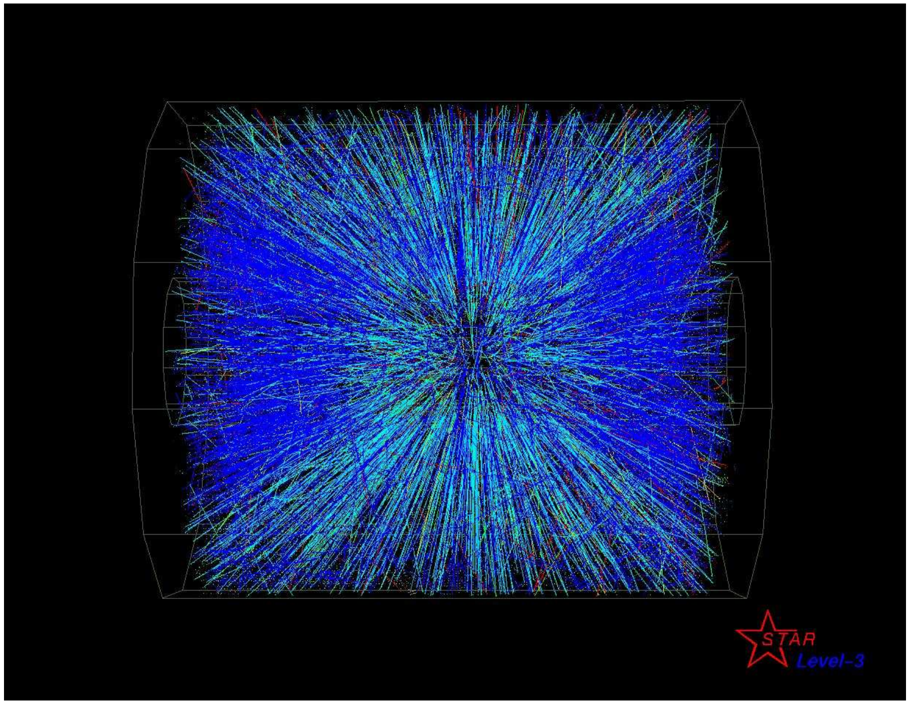
The STAR detector



Summer run 2000 statistics

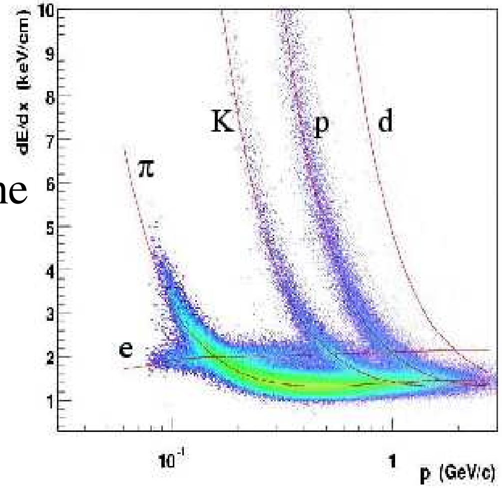
- Magnetic field: 0.25 T (½ nominal field).
- Detectors: TPC, RICH, 1 ladder SVT, ZDC, CTB.
- Triggers:
  - 844K central triggers (15% σ_{geo}),
  - 761k minimum bias,
  - 20k peripheral ($\gamma\gamma$).

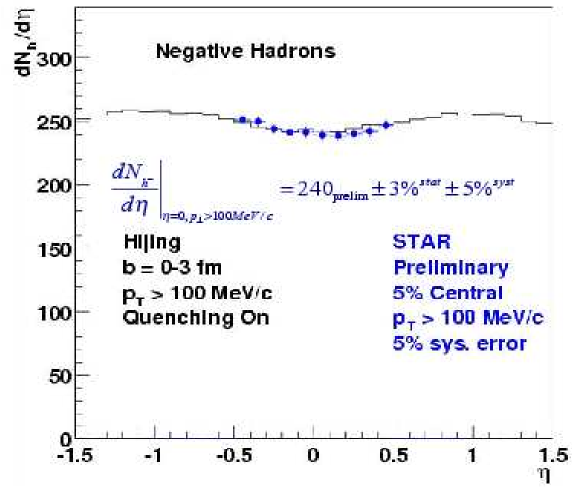




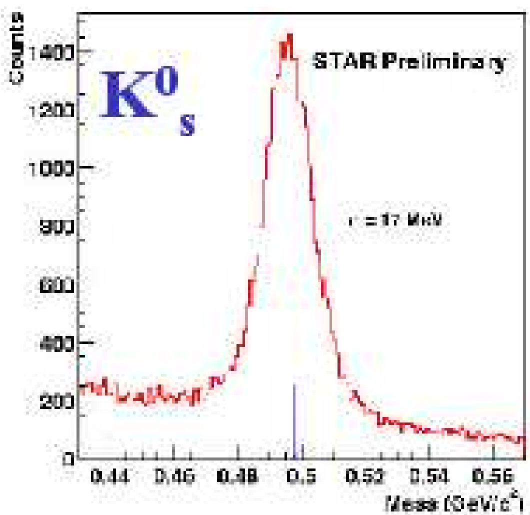
First results

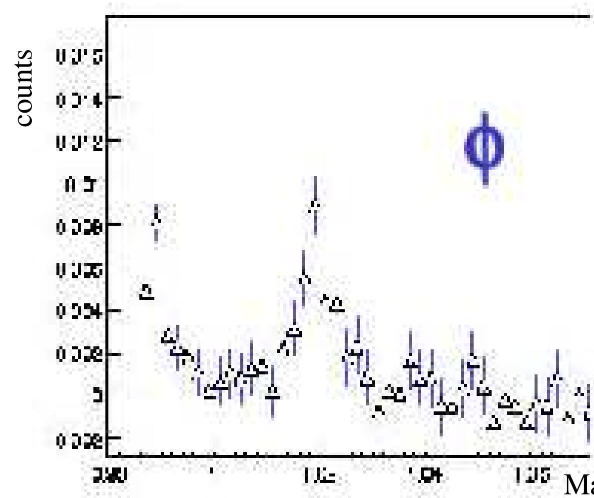
dE/dx resolution is 8%, to be compared with the best achievable resolution: 7%.





Reconstructed K0.s. The mass resolution is 17MeV/c^2.





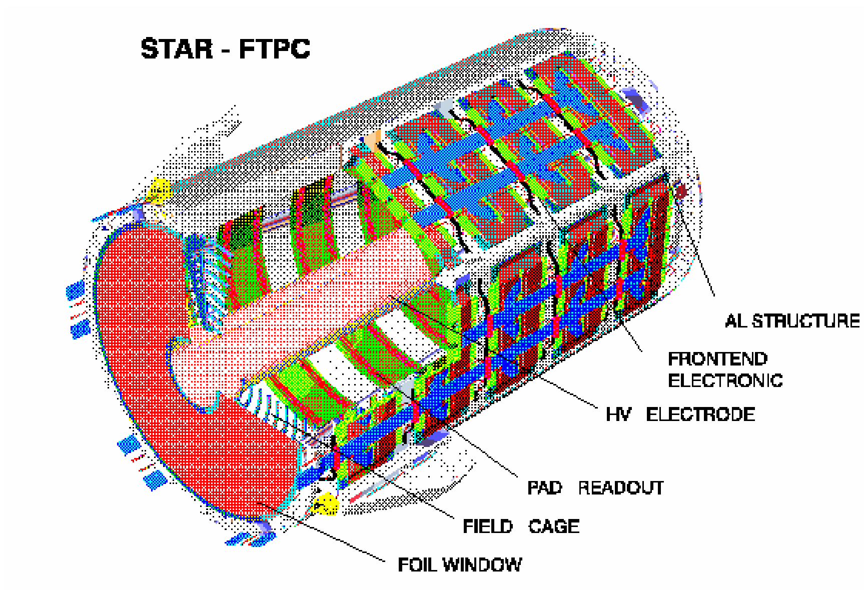
Mass (GeV/c^2)

A paper on flow is accepted for publication by Phys. Rev. Lett. (nucl−ex/0009011)

Physics with the FTPC

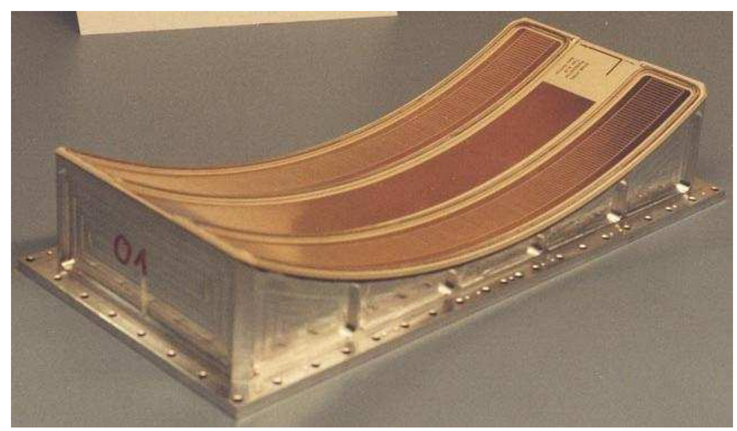
- Event by event (fluctuations);
- Charged particles spectra and yields;
- Strange particles (Λ, K_0);
- Directed and elliptic flow;
- Disordered Chiral Condensate (with PMD);
- Large acceptance for p–A Physics.

The FTPC

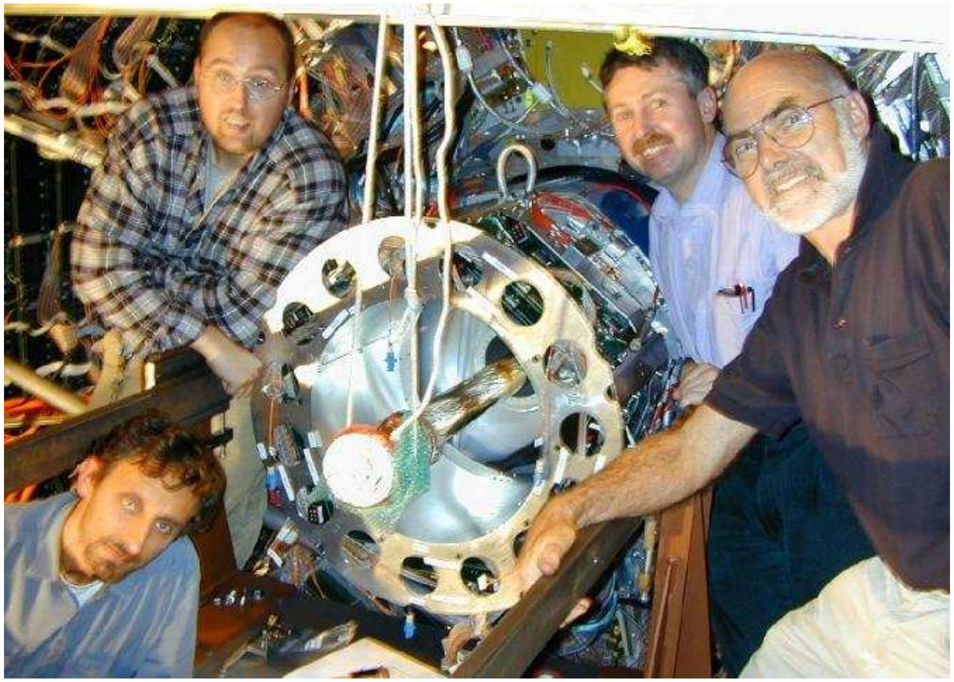


- Radial drift
- 10 rows, 960 pads each
- 23cm maximum drift length
- Ar/CO_2 50%/50% gas mixture
- Cathode voltage 10–15kV
- Drift velocity: 3–20mm/µs
- Gas gain: 1–2 x 10^3

- Pseudorapidity coverage: $2.5<|\eta|<4$
- position resolution $\geq$ 100µm
- momentum resolution $\geq$ 12%
- 256 time bins, 200ns width
- two track resolution $\geq$ 1mm.

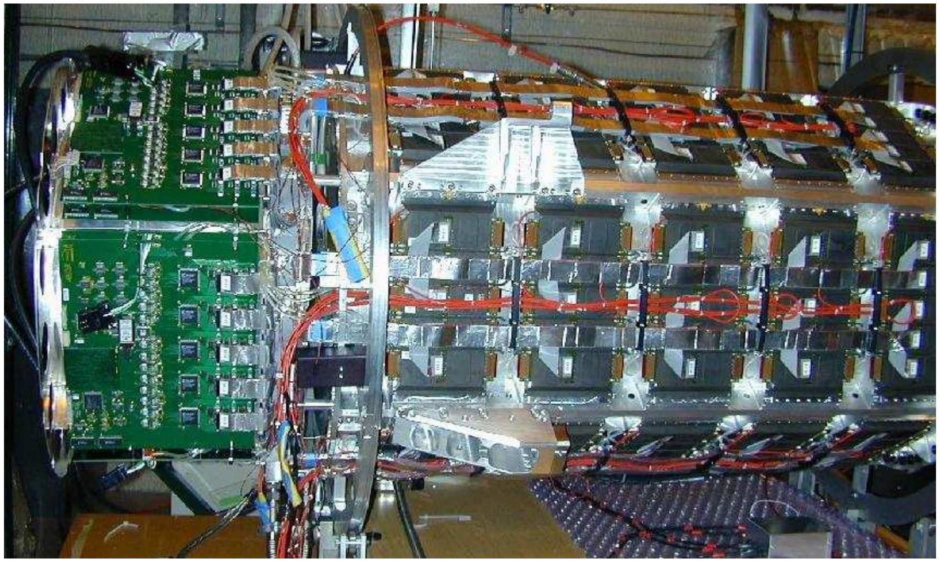


FTPC status



The West FTPC installed in the experiment, system test is going on.

Both FTPCs were delivered in perfect timing to BNL thanks to the efforts of the technical division.

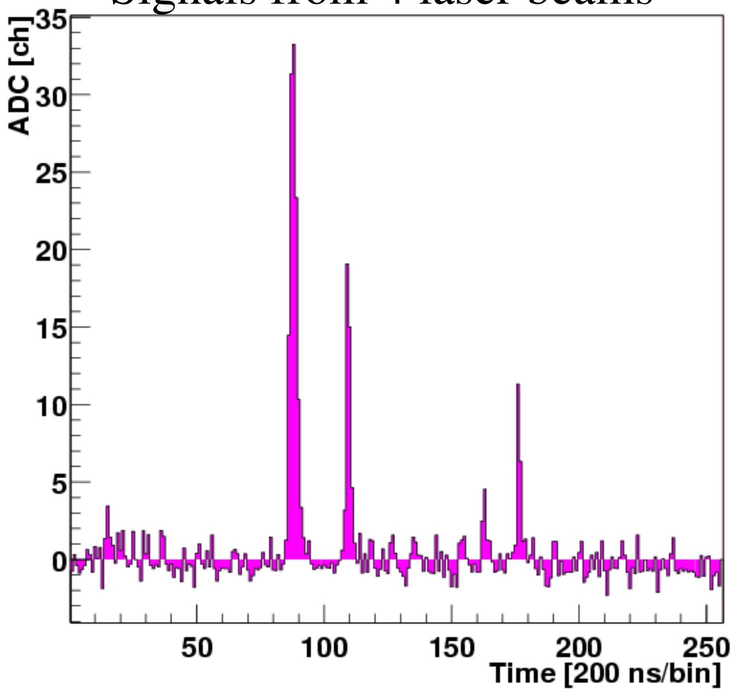


The East FTPC on the test bench, tests are going on.

FTPC status

- Gas tightness of the chamber: 4PPM at a flow of 50 l/h.
- Electronic noise < 0.8 ADC channels.
- Laser signals were detected from all 15 beams.
- Cosmic rays signal to noise ratio > 100.

Signals from 4 laser beams



Signal from a cosmic ray