

Drift Chamber R&D Update

INFN - LNF

R&D Plan

⊙ Wires layout and operating conditions

- Study alternative cell geometries and sizes
- Study alternative gas mixtures

⊙ Mechanical structure

- Engineering of alternative end plates geometry and material

⊙ Electronics

- Find solution to minimize material

DCH Operating Conditions

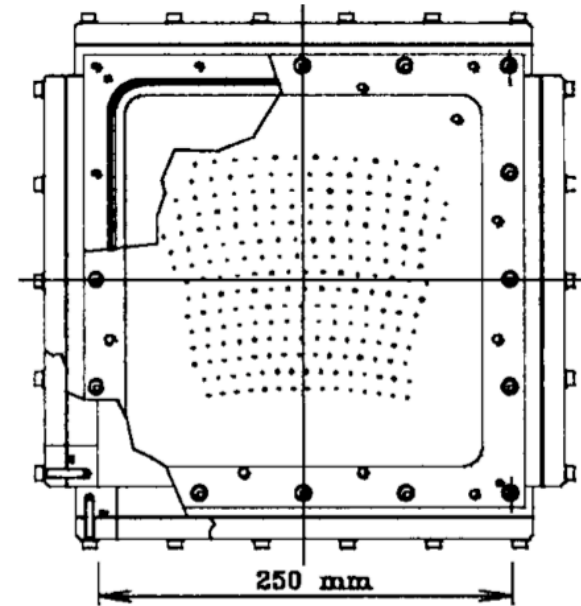
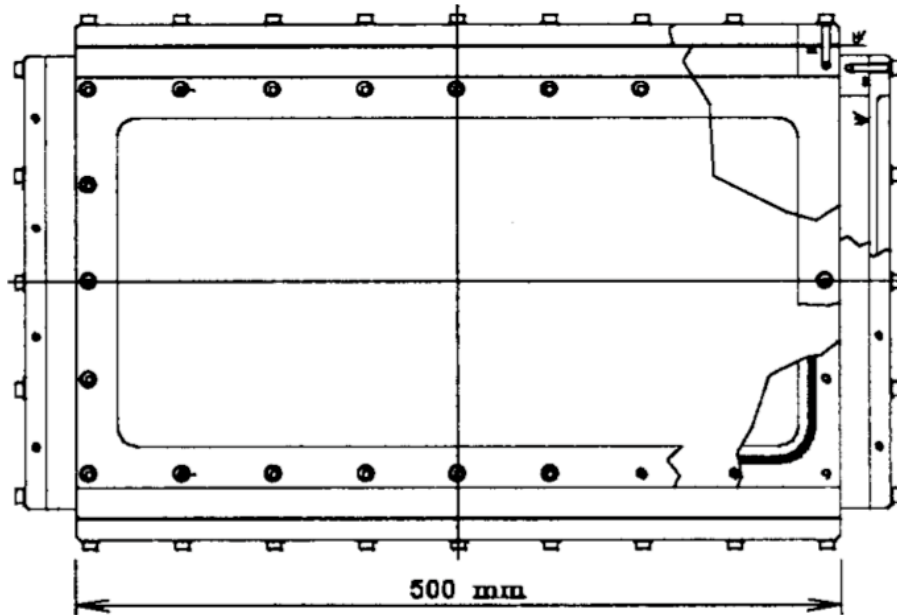
- ⊙ Benchmarks are
 - Spatial and dE/dx Resolution
 - Efficiency
 - Rate capability
- ⊙ Garfield simulations
- ⊙ Prototype with different cell shapes/sizes
- ⊙ External tracking telescope with sufficient resolution ($\approx 100 \mu\text{m}/\text{point}$)
- ⊙ Beam Test (BTF Frascati/other)

KLOE Experience

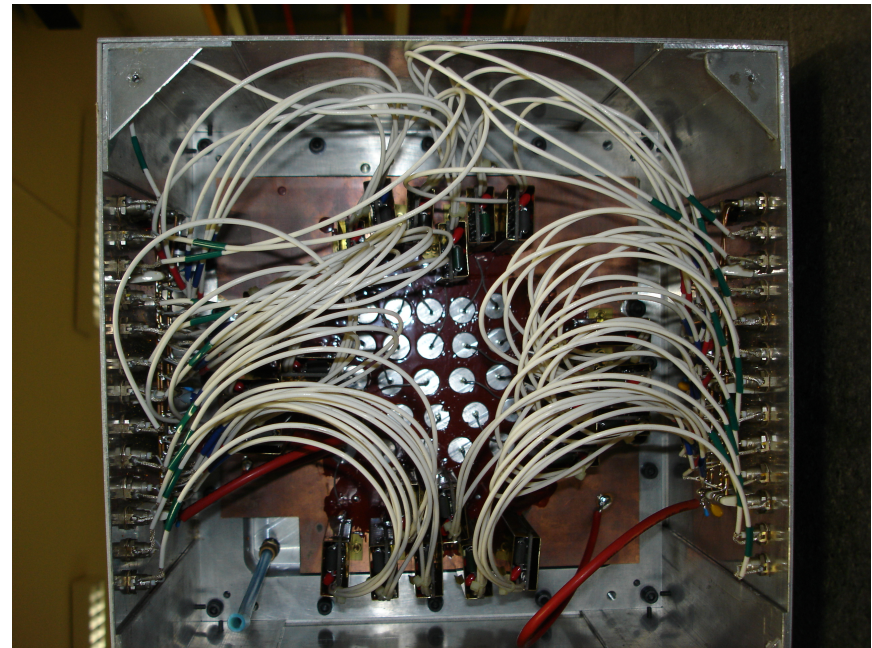
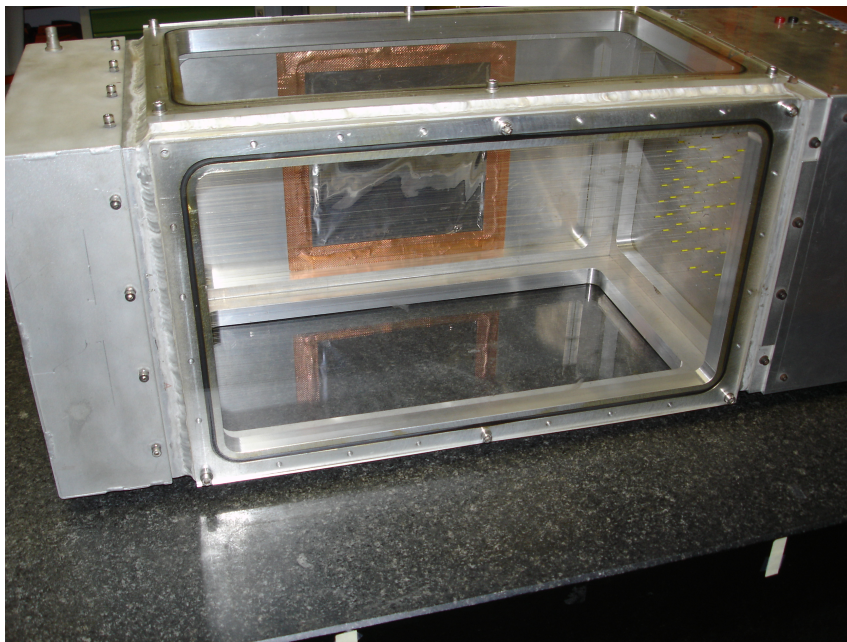
- ⊙ Our group in Frascati designed and built the KLOE DCH
 - Largest drift chamber ever built to date
 - 52k wires, all stereo rectangular cell, 3:1 field/sense wire ratio
- ⊙ Built three small prototypes to test the various layouts
- ⊙ Built a precision tracking telescope

The KLOE Prototype

- See “KLOE Central Drift Chamber – Addendum to the KLOE Technical Proposal”, LNF 94-028 (IR), June 1994

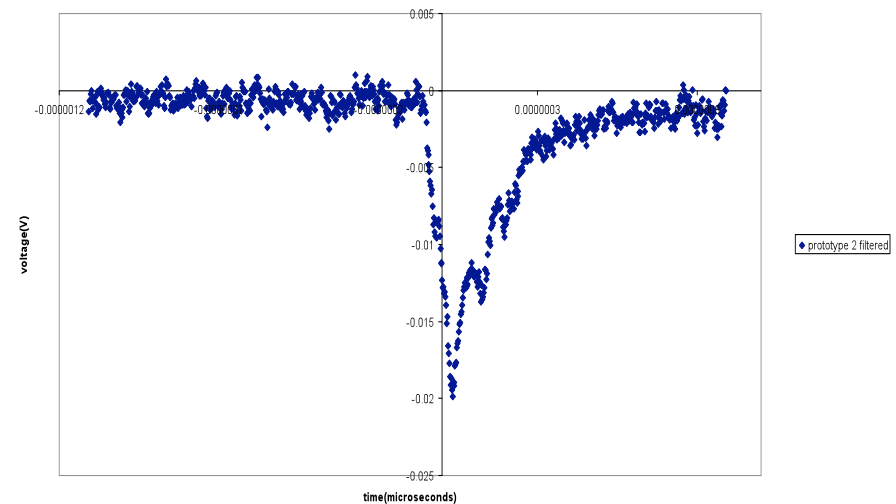
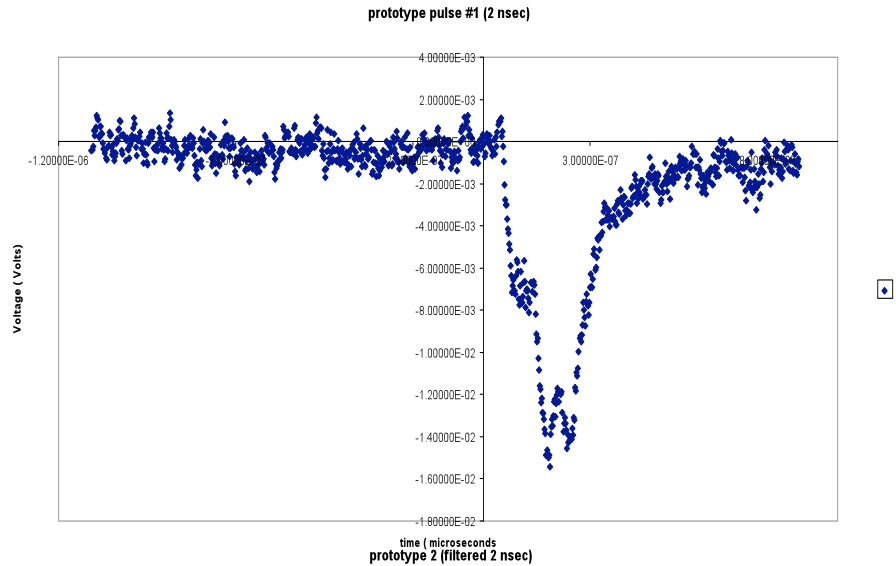


The KLOE Prototype



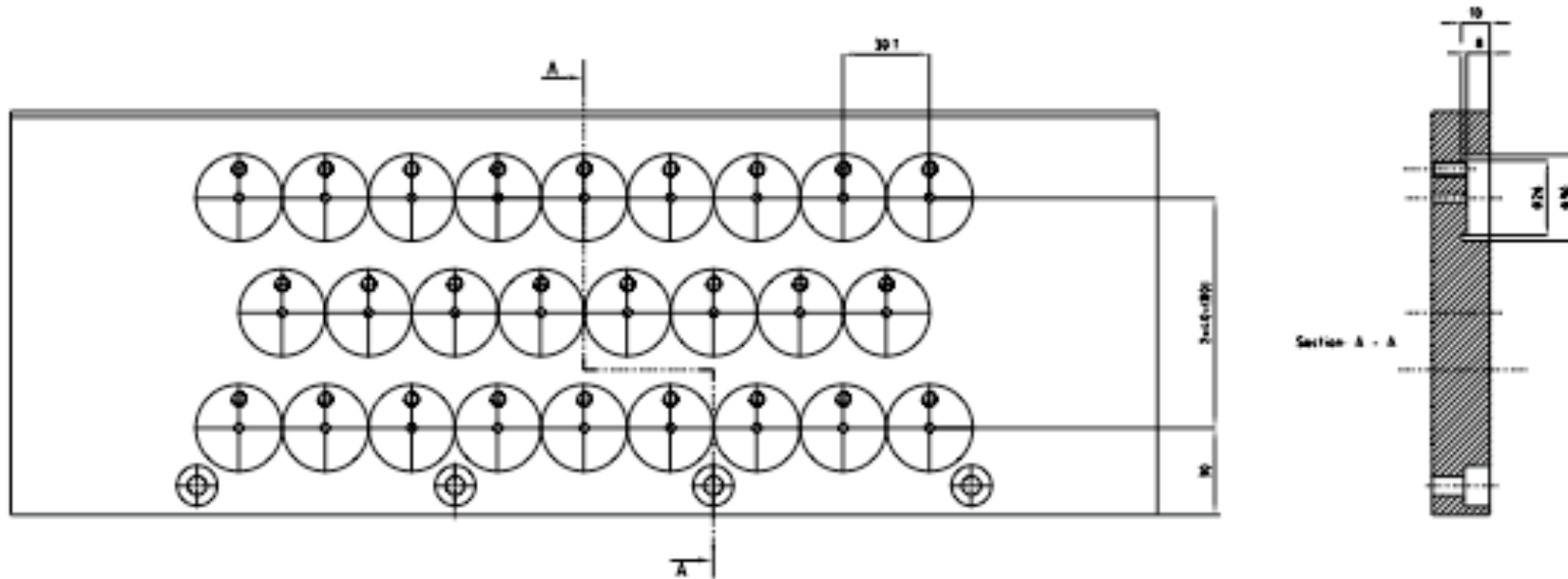
Prototype Re-Commissioning

- ⊙ We started the commissioning of the old prototype
 - Wires OK
 - Electronics OK
 - Gas tightness OK
- ⊙ Read out few channels
 - Signals look good
 - Need more electronics to read out all
 - underway
- ⊙ Bolted end plates can be easily replaced with new ones with different cell geometries

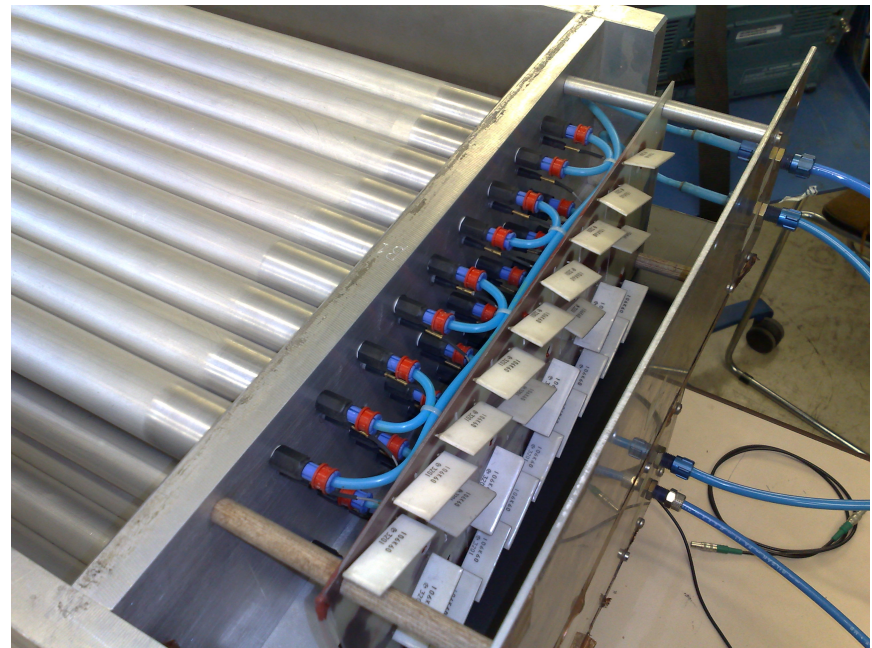


The KLOE “Mini-Trackers”

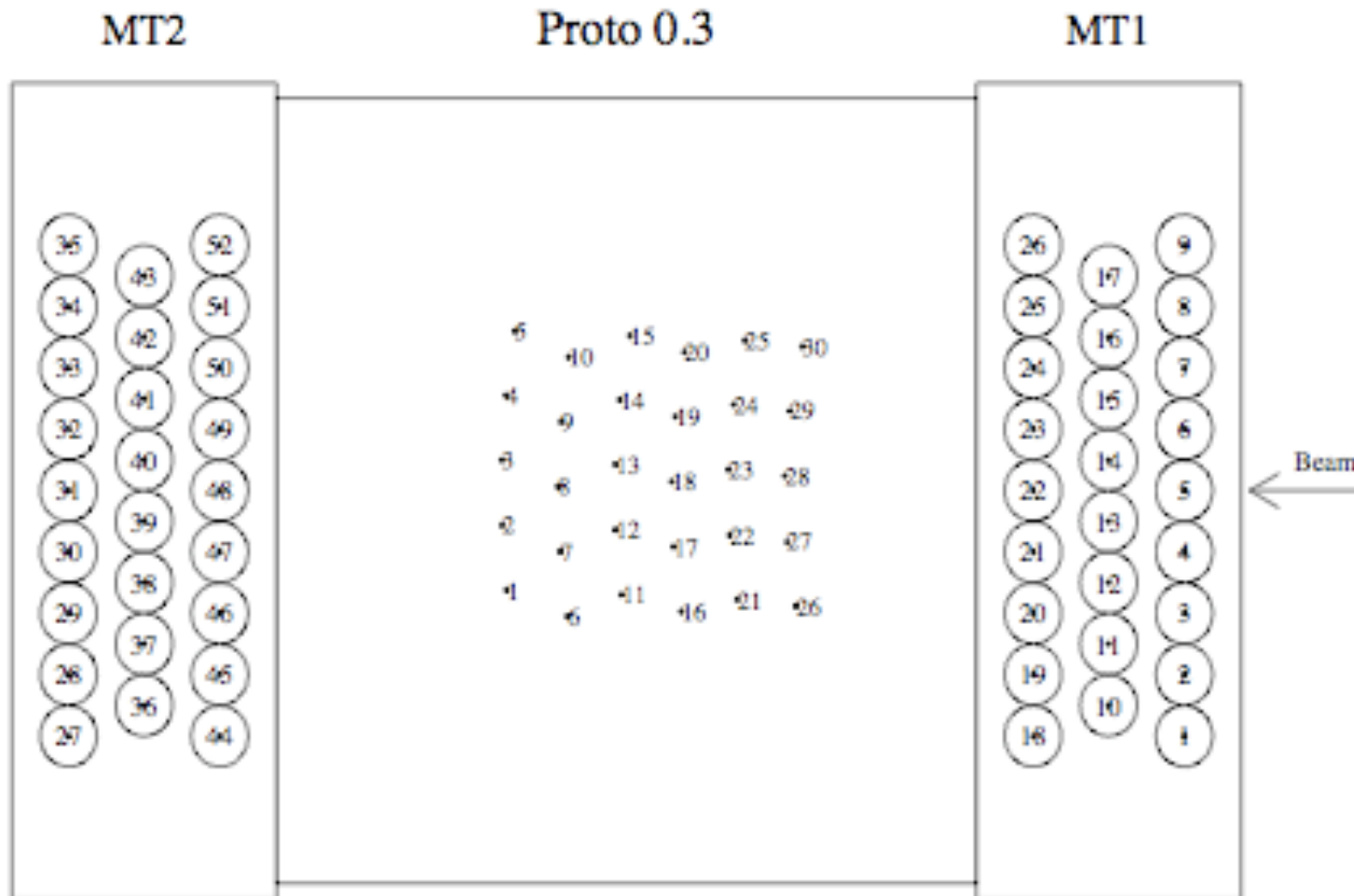
©See: NIM A367, p154-158, 1995



The KLOE “Mini-Trackers”

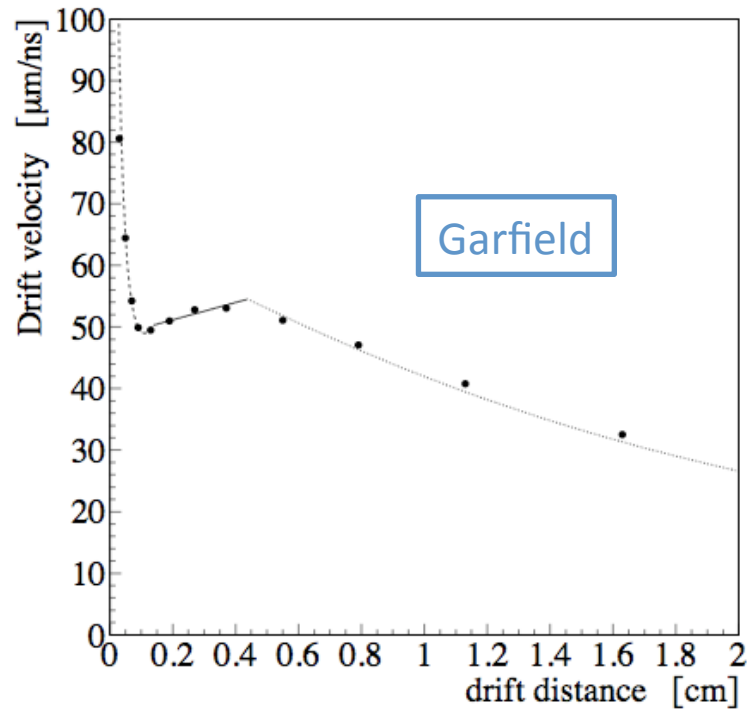
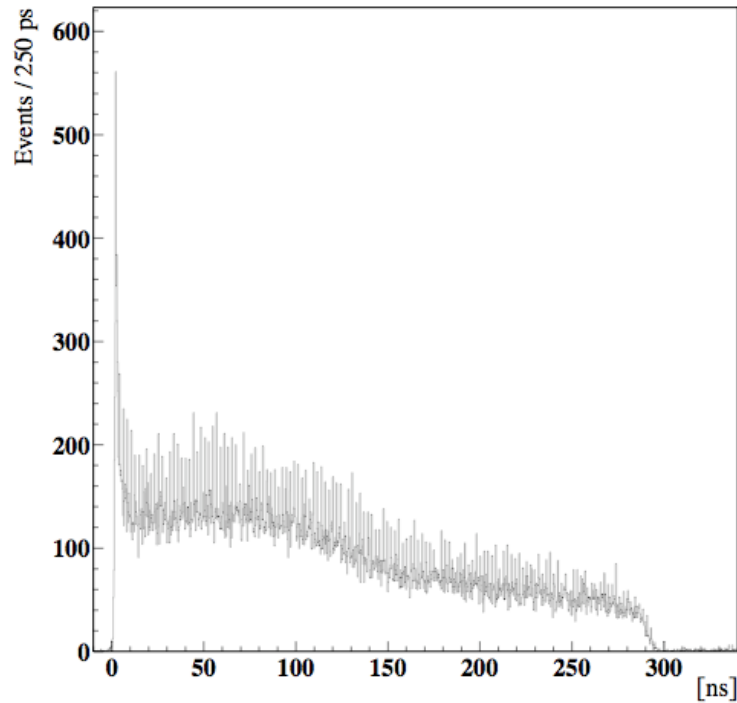


MT with DCH Prototype



MT Performances

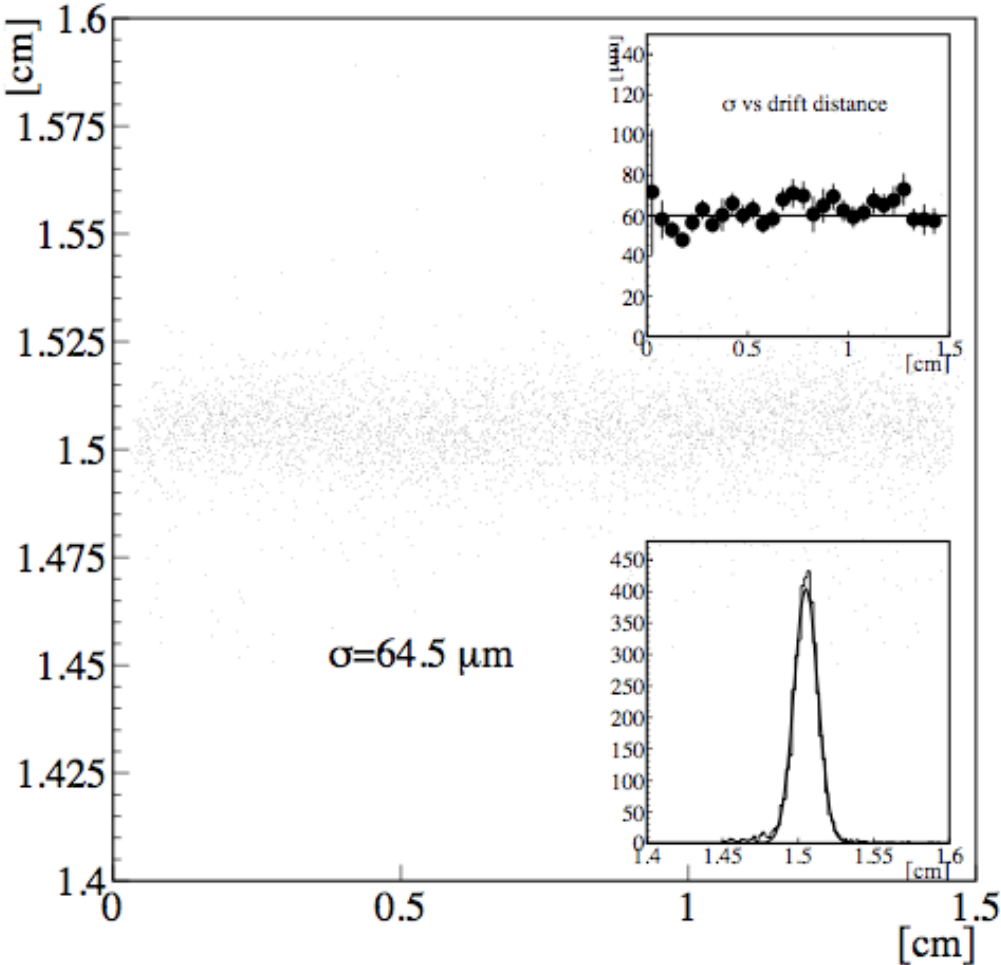
1994



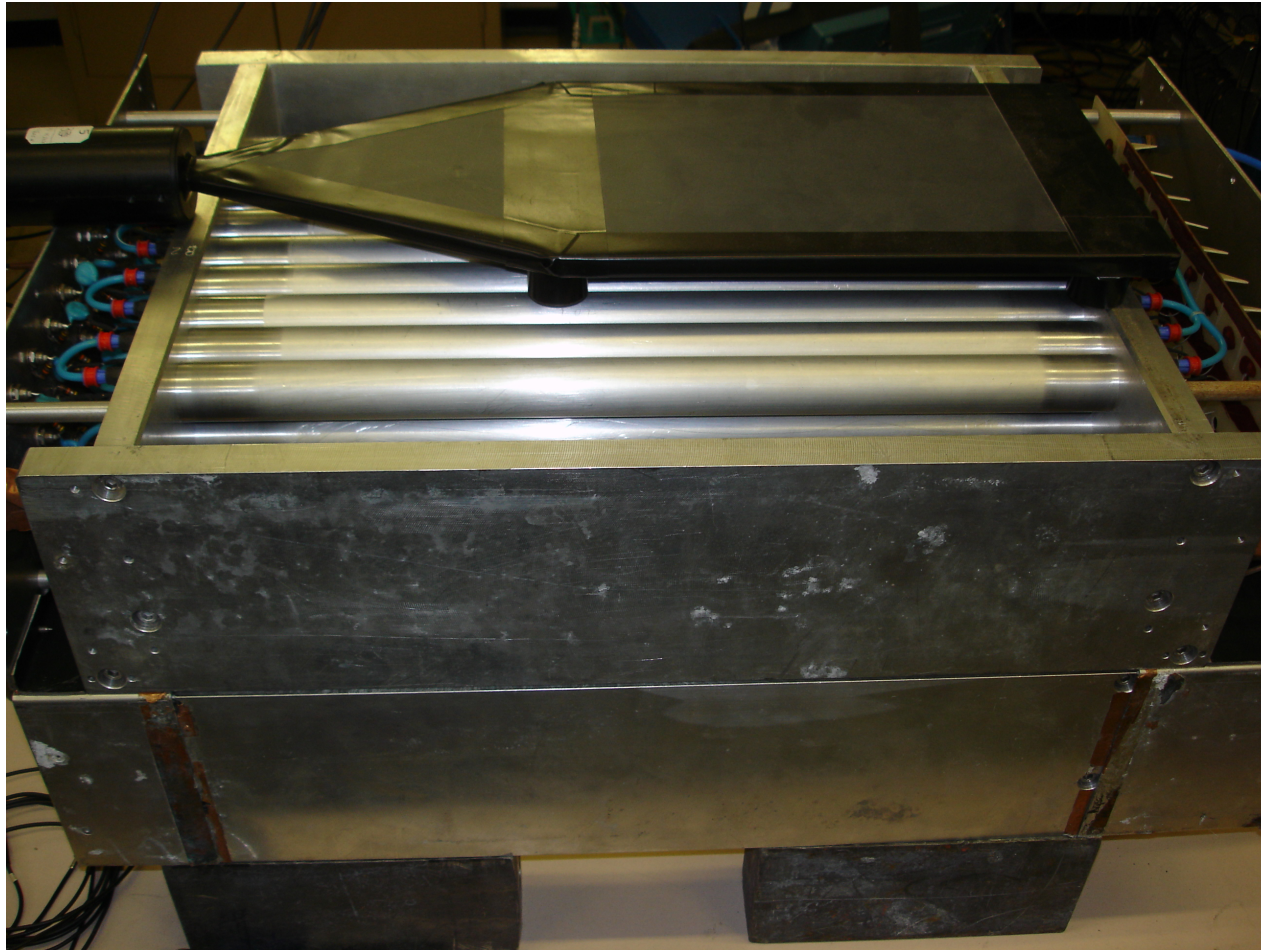
$$V_{\text{drift}} \approx 50 \mu\text{m/ns}$$

MT Performances

1994



Mini Trackers New Setup



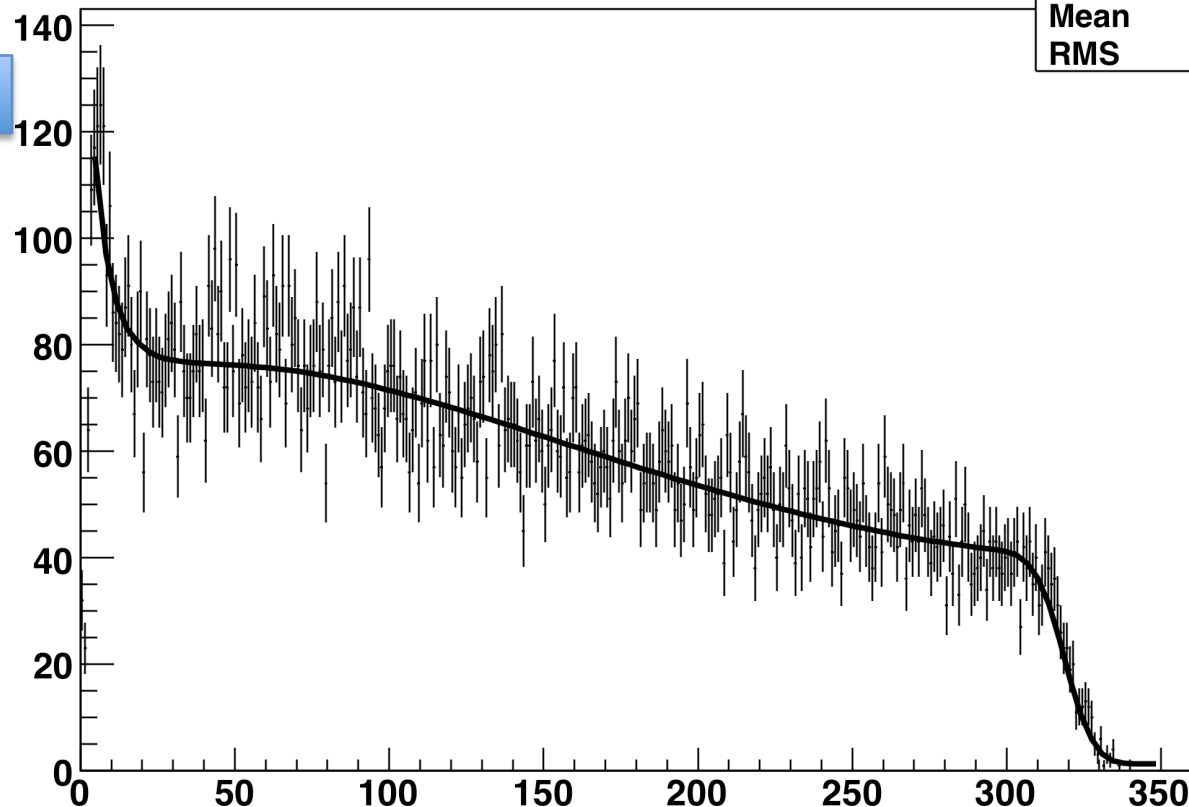
Preliminary Performances

2008

hTDC07

hTDC07	
Entries	100000
Mean	139
RMS	90.26

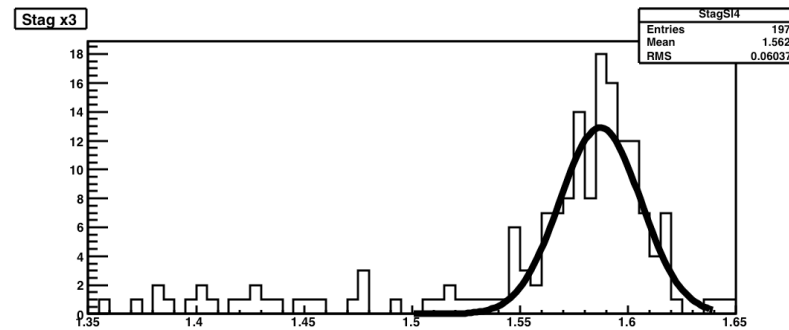
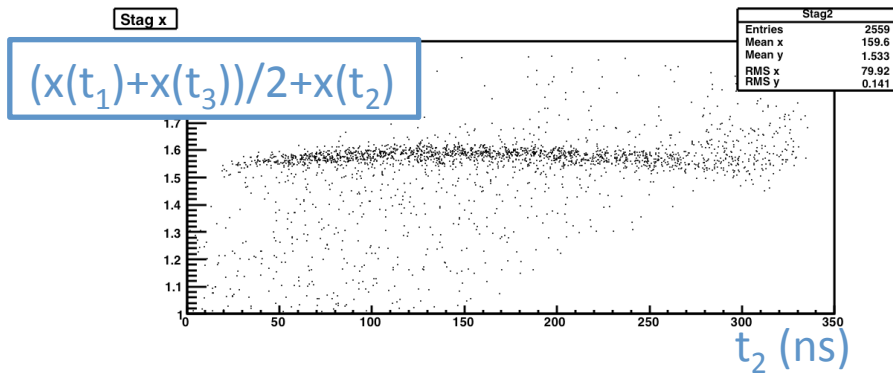
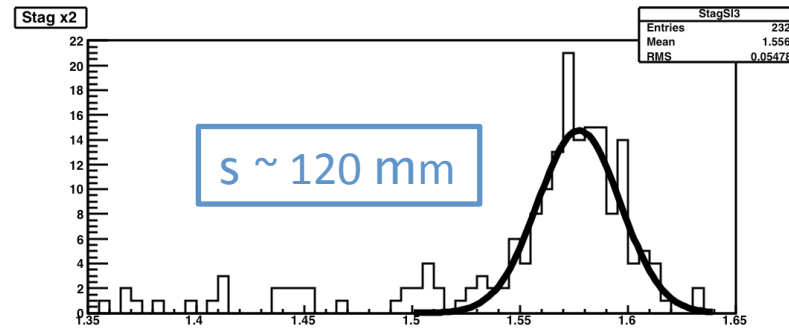
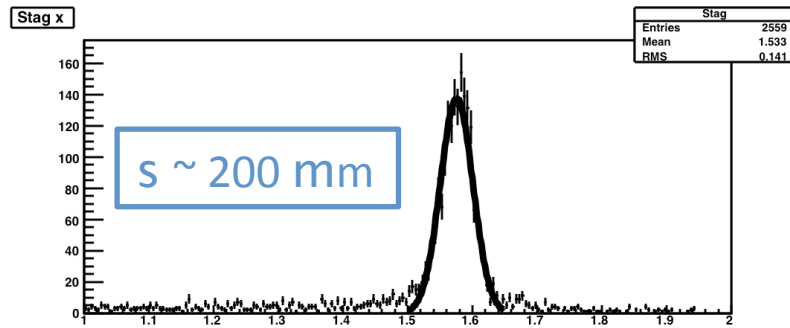
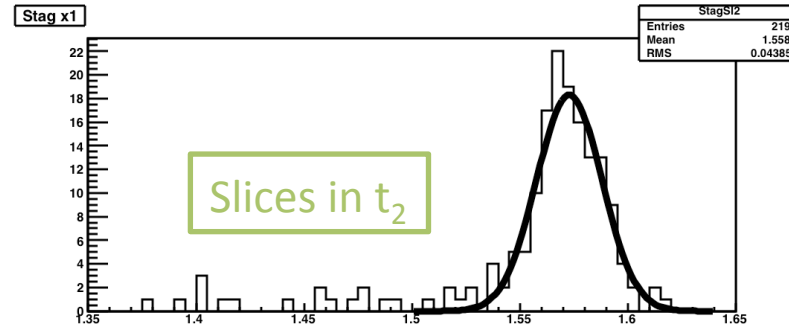
$dN/dx * dx/dt$



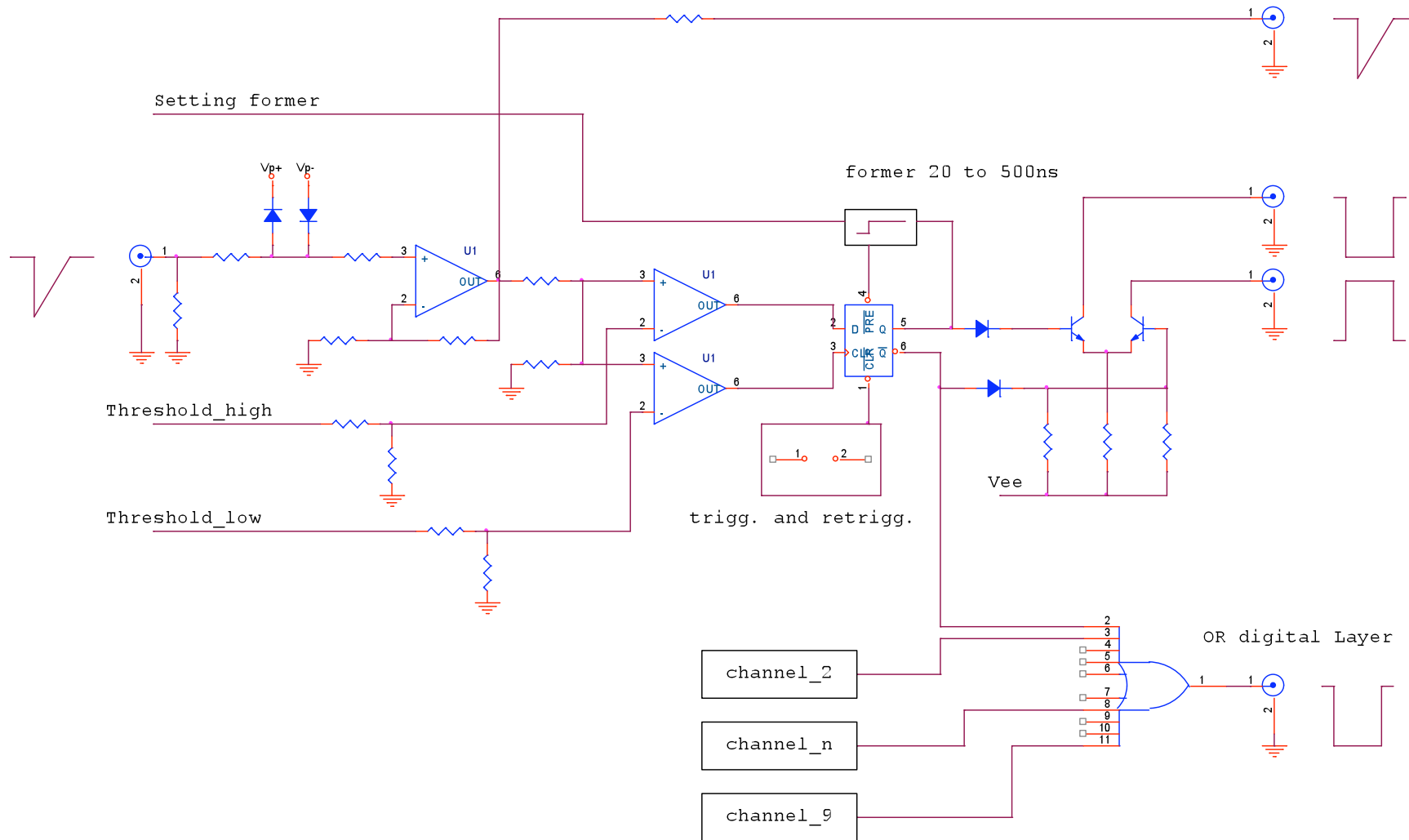
ns

Preliminary Performances

2008



MT Read Out Electronics



Summary and Outlook

- ◎ We set up all the necessary tools for our R&D plan
- ◎ Proceed with full commissioning of the Mini Tracker and present prototype
- ◎ Proceed with Garfield simulations of various cell geometries to select few solutions to test
- ◎ Build new prototype's end plates with different cell geometry solutions
- ◎ Systematic comparative study
- ◎ Test Beam