G_E^n Detection Equipment Status Report

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Hall A Collaboration Meeting

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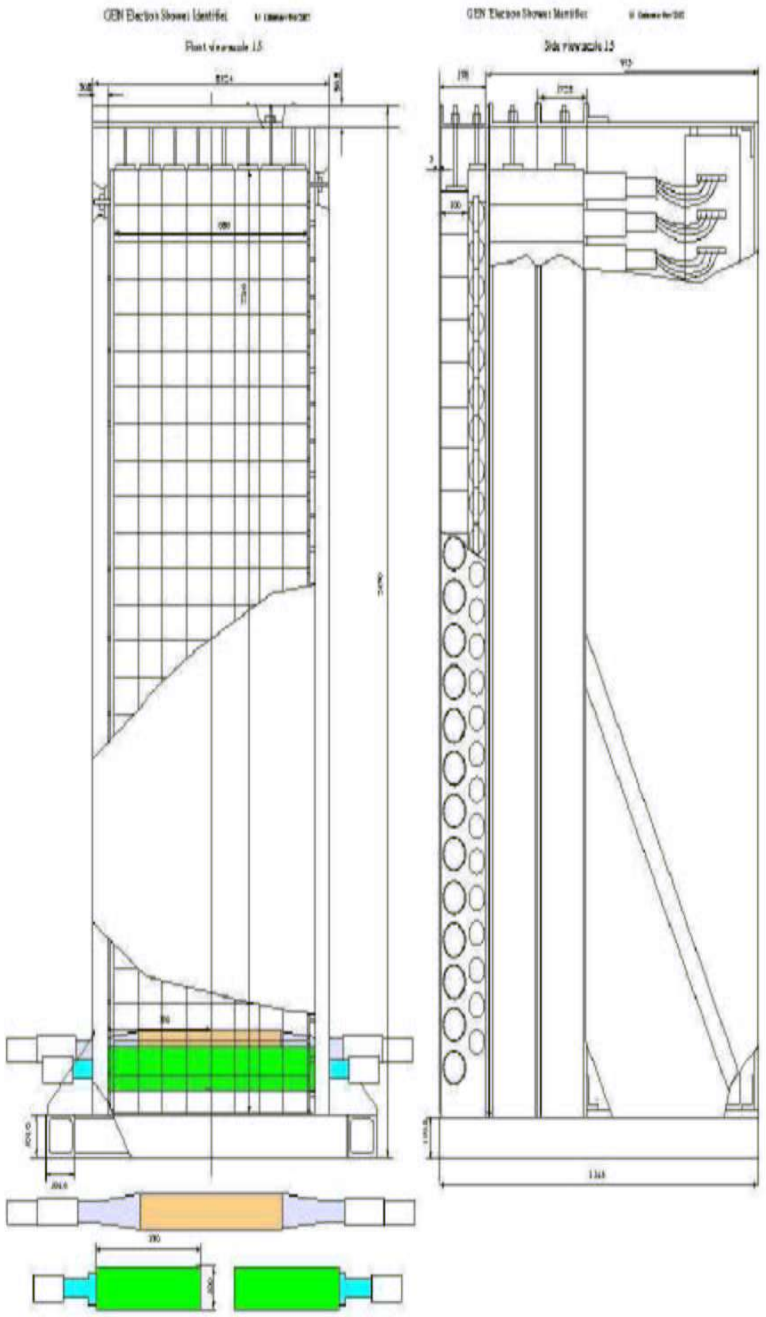
What We Have Built

- Array of plastic scintillator counters.
- Veto plane provides proton rejection.
- Spatial resolution ~ 10 cm.
- Time resolution ~ 0.3 ns.
- Extract quasi-elastic events.
- Match BigBite's large momentum acceptance.

What We Have Built

- Pre-Shower 2 x 27 Pb-Glass - Shielded PMTs.
- Main Shower 7 x 27 Pb-Glass - Shielded PMTs.
- Longitudinal Profile of the energy loss distinguishes electron from pion.
- Energy resolution 6-7%.
- Pion rejection factor > 100.
- Electron efficiency 0.97-0.98.

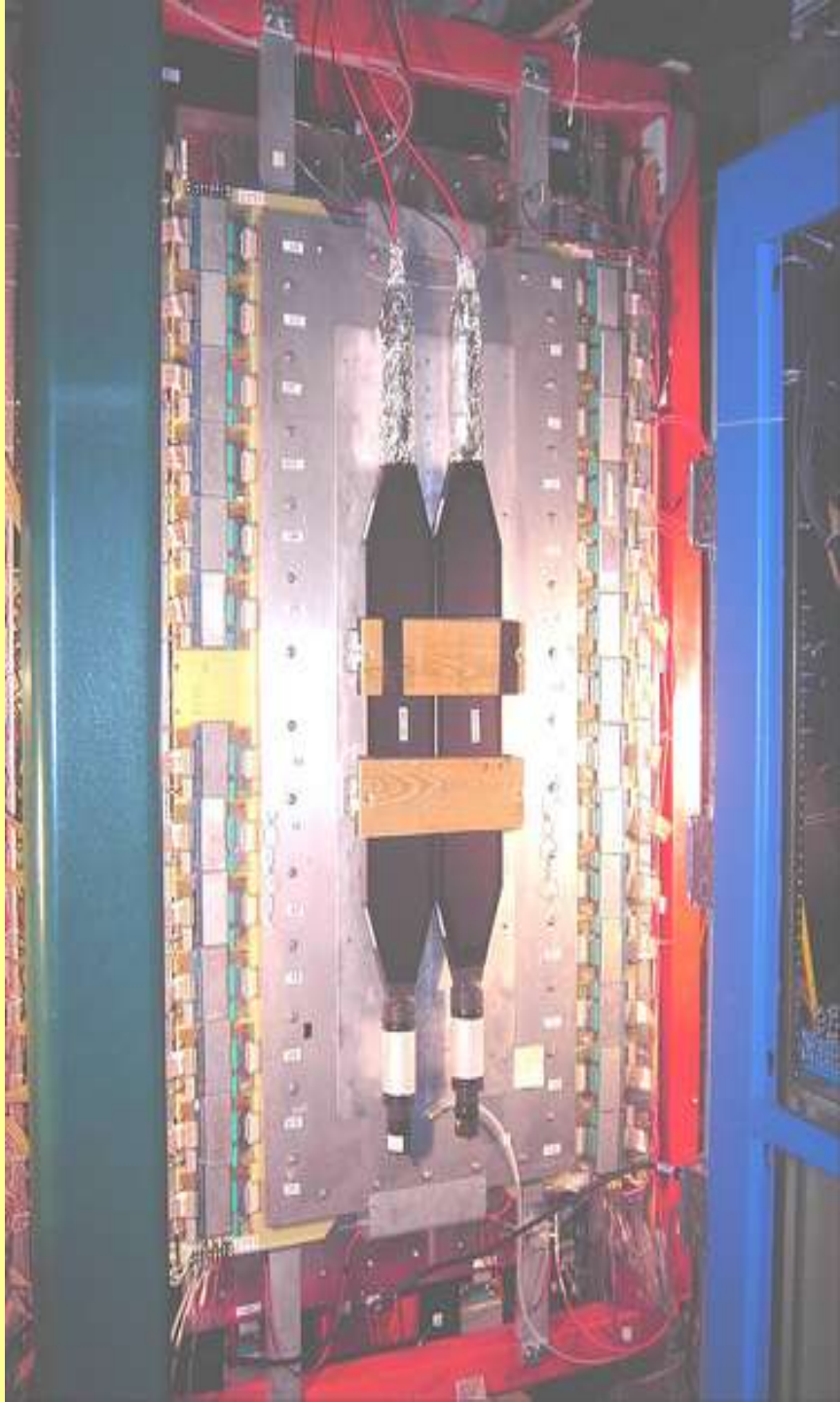


What We Have Built

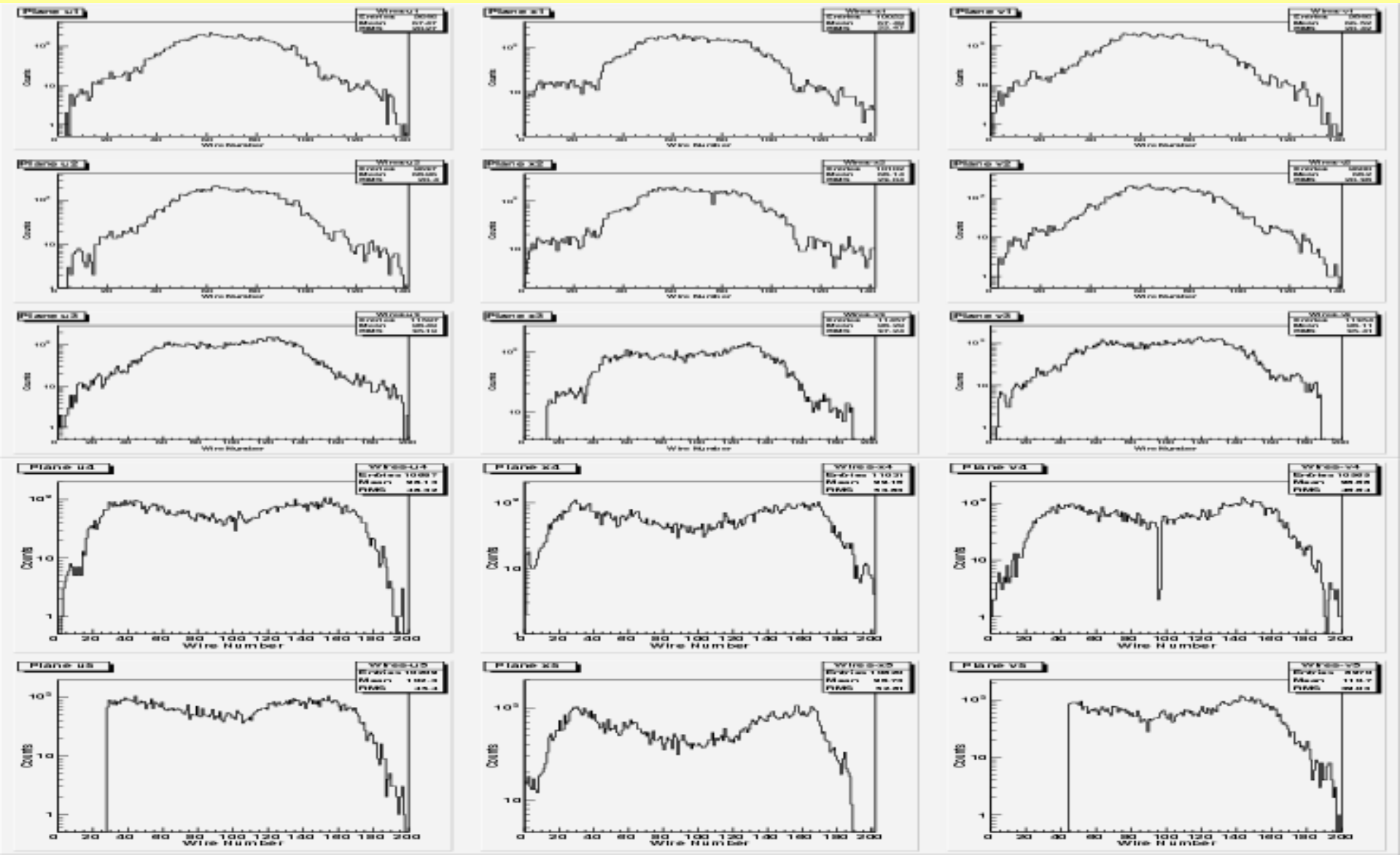
- **Three drift chambers:**
  - **1st and 3rd chambers**
    - Resolution ~ 200 μm
  - **2nd chamber**
    - Resolution ~1cm: to increase high rate and multi-track capabilities
- **Active area:**
  - 1st 140 cm x 35 cm
  - 2nd and 3rd 200 x 50 cm

Status of the Project

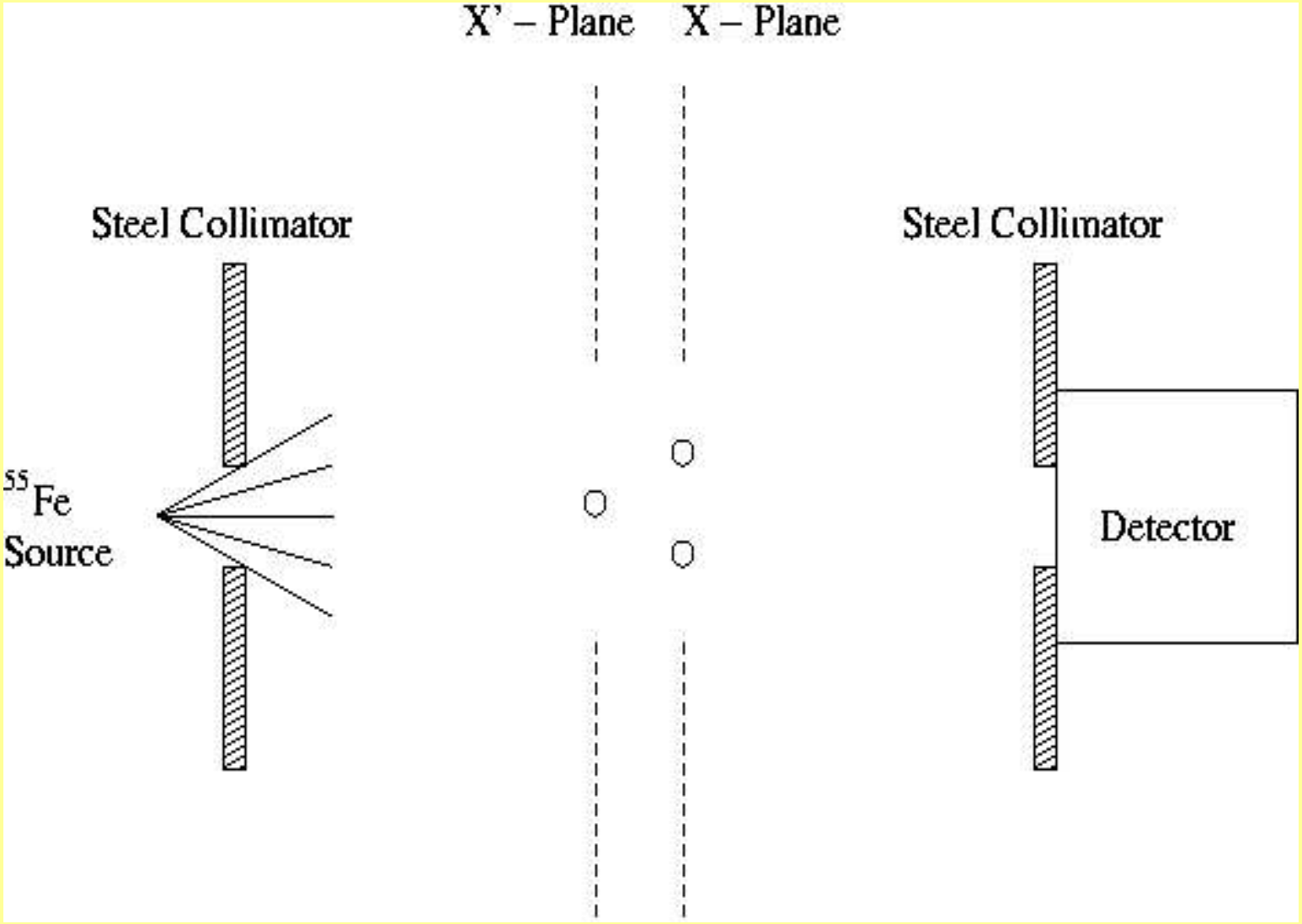
- **All chambers tested extensively:**
  - **Hold HV well, very stable.**
  - **Dark current levels are very low.**
  - **No dead wires or noisy wires.**
  - **Parasitic high rate data taking during HAPPEX experiment**
  - **Efficiency and resolution studies completed on front chamber**



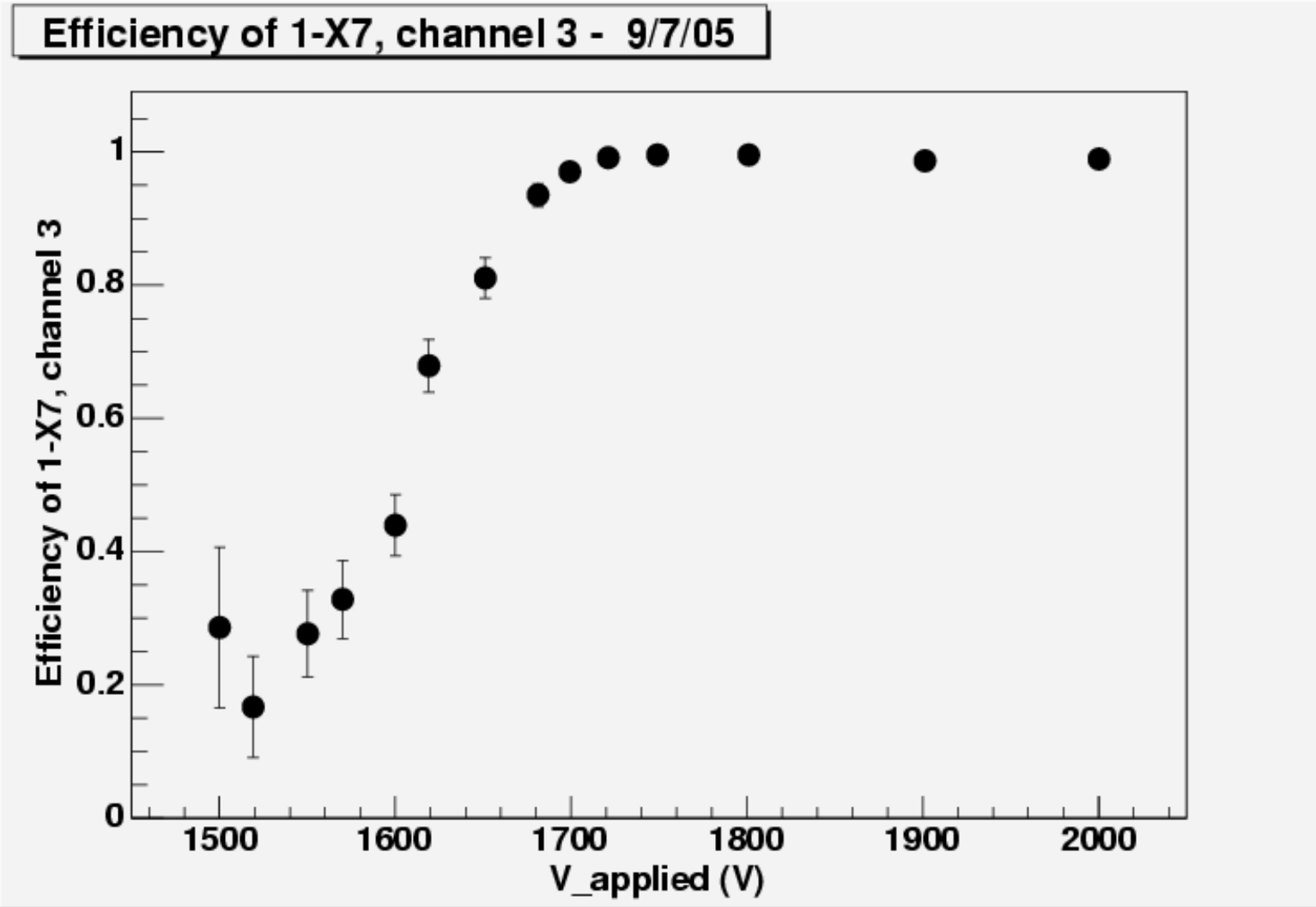
Cosmics Studies



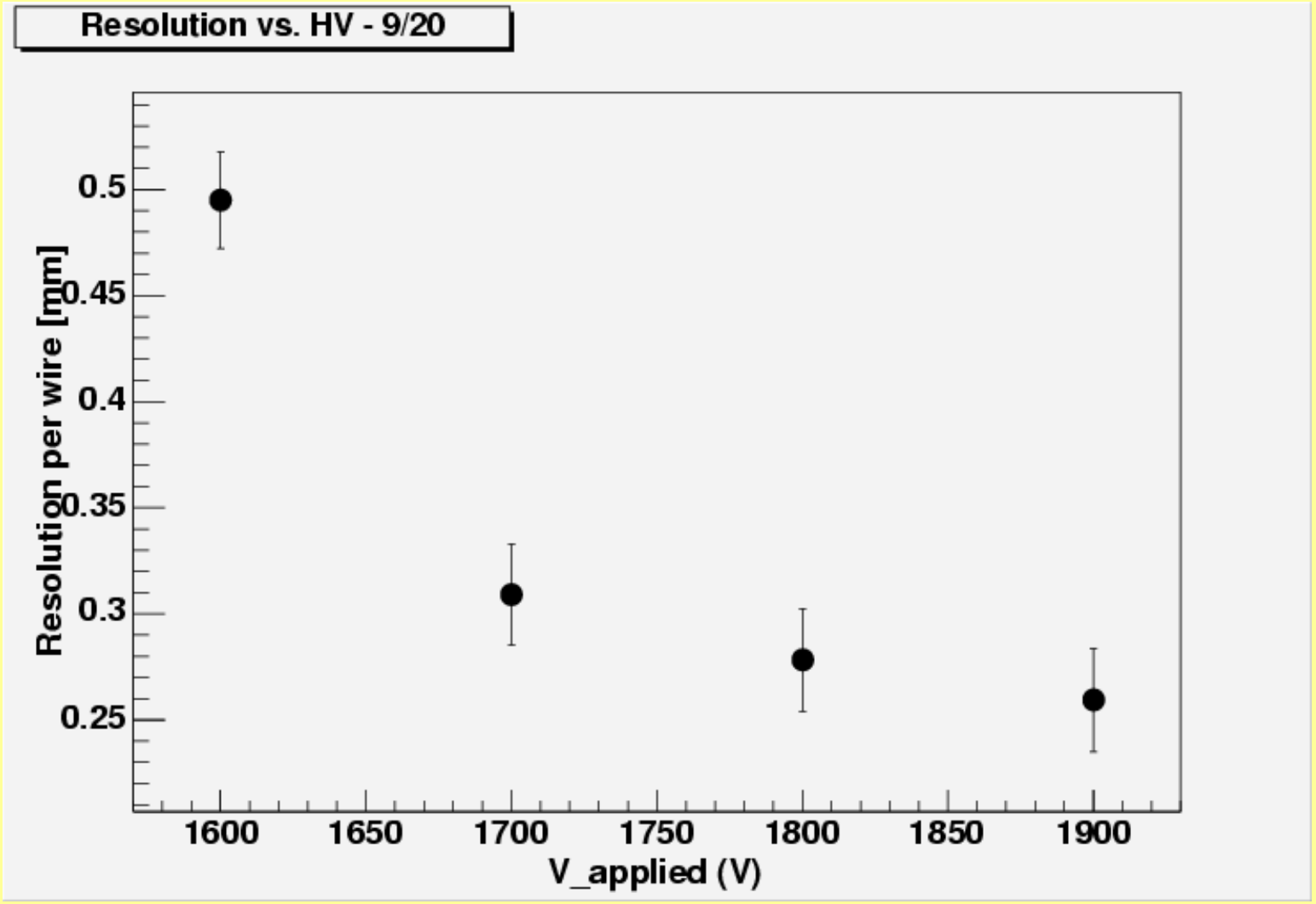
Studies with ^{55}Fe Source



Source Studies - Efficiency



Source Studies - Resolution



Parasitic Beam Test

- Install chambers with no shielding at a distance of 10 m from the target and scattering angle θ ~ 70°.
- Luminosities in range $1 * 10^{35}$ – $30 * 10^{35}$ cm^{-2} Hz.
- Chambers exhibit low current drain.
- High voltage is stable.
- Low energy background expected to be ~ 50 MHz through front chamber.

Milestones

- **November 1** – Completion of testing of BigBite. Completed November 28.
- **November 28** – Completion of N-arm testing in lab. Begin decabling. Passed – Decabling began November 29.
- **December 5** – Begin moving BigBite. Passed – Move scheduled for December 6.
- **January 5** – BigBite DAQ operational in hall.
- **January 16** – Install BigBite platform.
- **January 25** – N-arm DAQ operational in hall.
- **February 5** – Synchronized readout of full DAQ operational in hall.
- **February 9** - BigBite operational checkout.
- **February 22** - Neutron arm complete with shielding etc.