

# Cross Section Measurements and Analysis at Rensselaer

## *Report at CSEWG meeting 2005*

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# Measurements Completed This Year

- Re
  - Used 7 metallic samples, thickness range of 1-100 mils.
  - Completed thermal (0.005-20 eV) and epithermal (5-1000 eV) transmission and capture measurements.
- $^{164}\text{Dy}$ 
  - 7 liquid ( $\text{D}_2\text{O}$ ) samples were prepared with 98% enriched  $^{164}\text{Dy}$ . Two metallic natural Dy samples also used.
  - Completed thermal (0.005-20 eV) and epithermal (5-1000 eV) transmission and capture measurements.

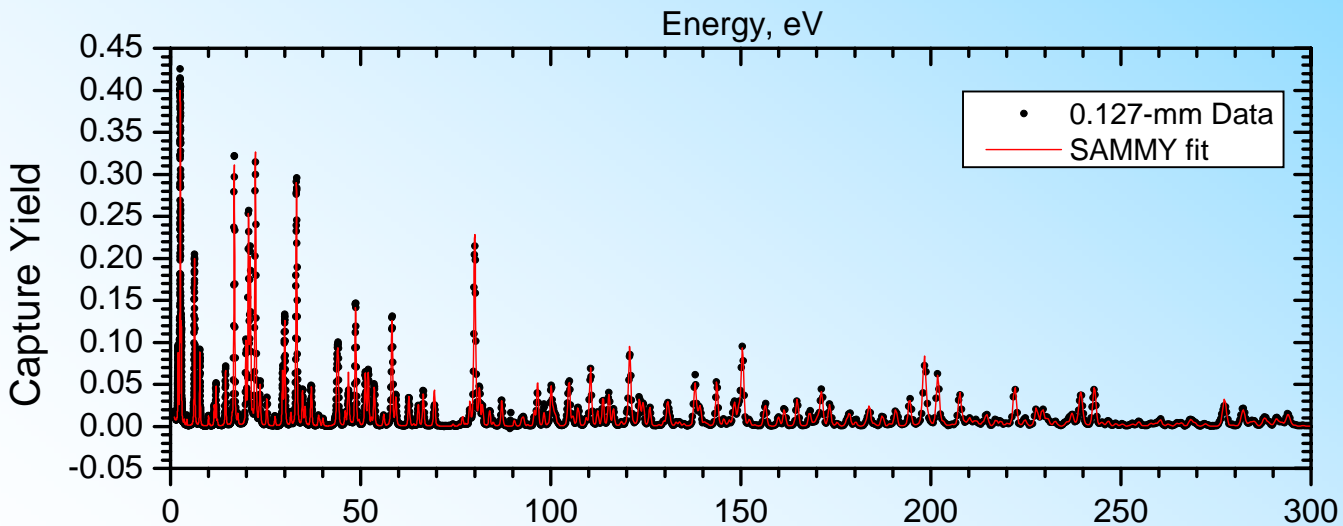
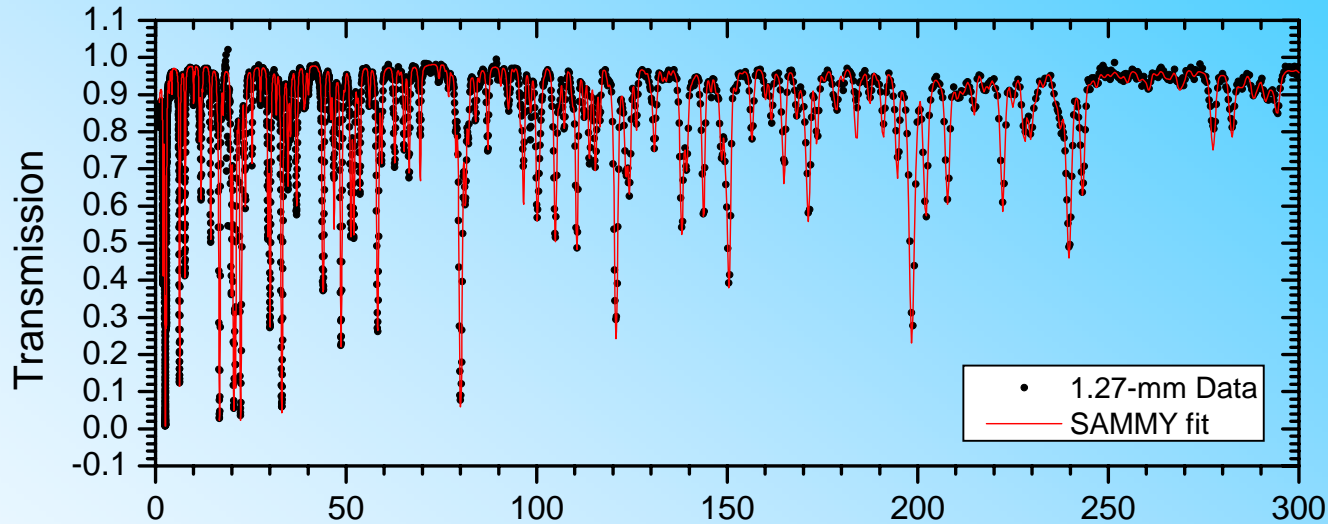
## Planned Measurements

- Transmission and capture on  $^{153}\text{Eu}$
- High energy (0.2-20 MeV) transmission of Be and Mo.

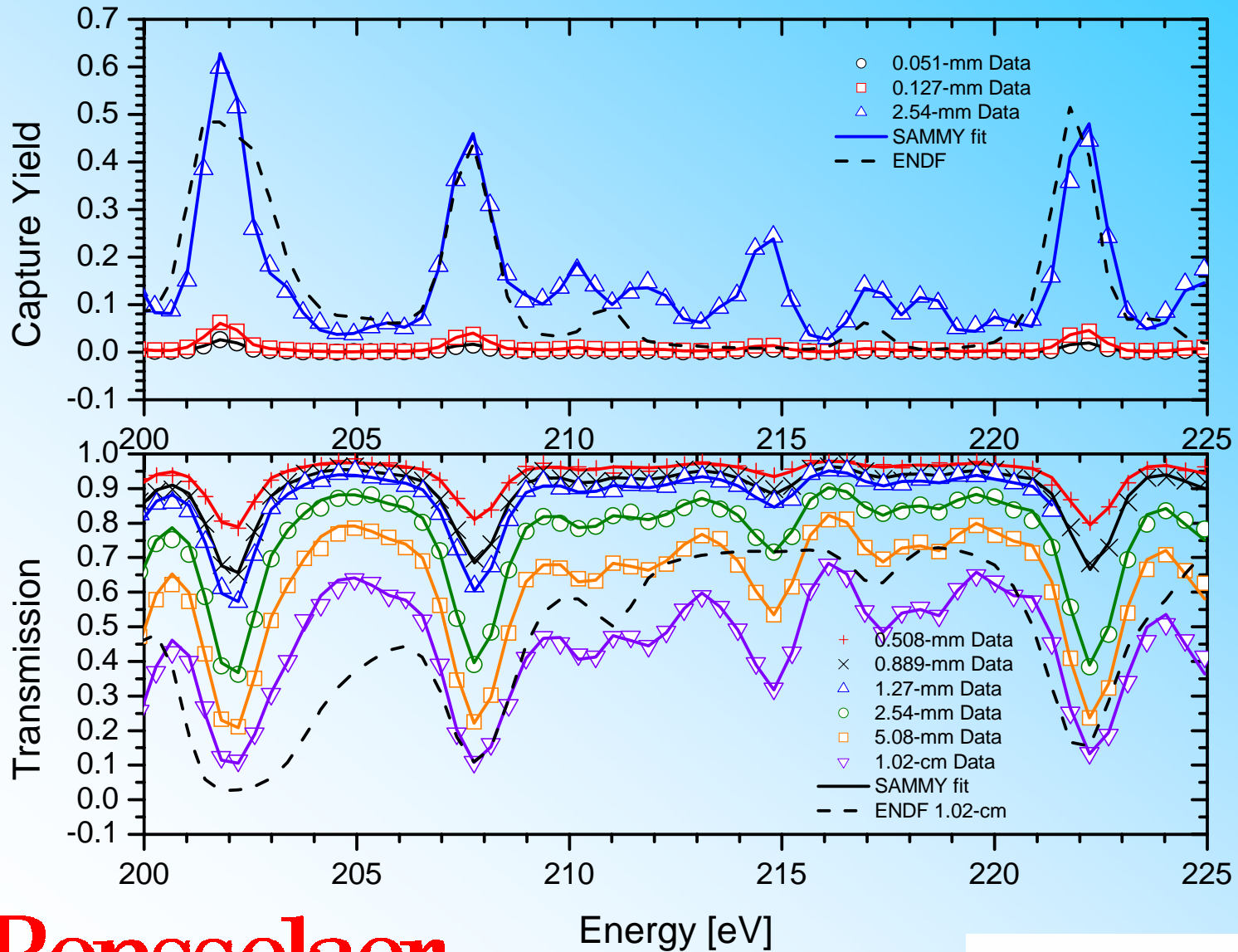
# Data Analysis

<b>Sample</b>	<b>Status</b>
Nd	Paper was accepted for publication in NS&E
Nb	Analysis completed, paper submitted to NS&E
Gd	Analysis completed, paper submitted to NS&E.
Rh	Transmission analysis started (using SAMMY)
Re	Data analysis started
Mo	Data analysis started

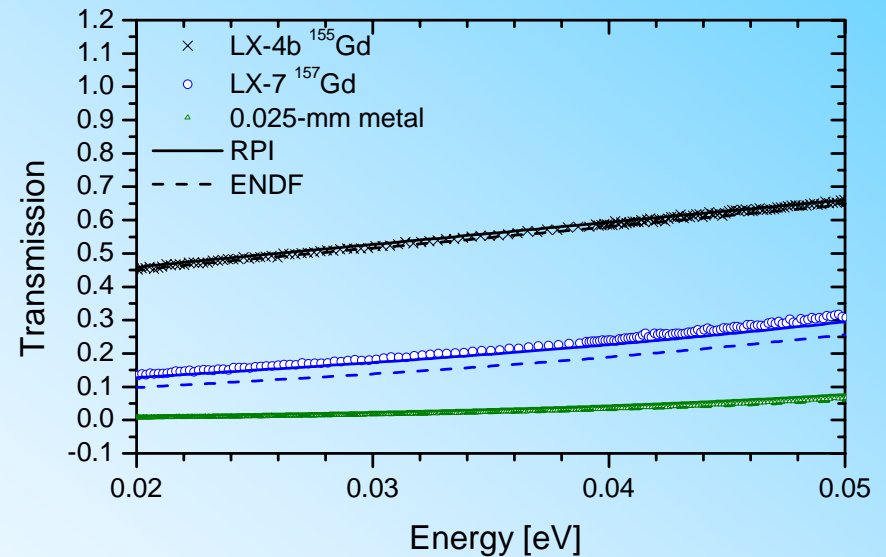
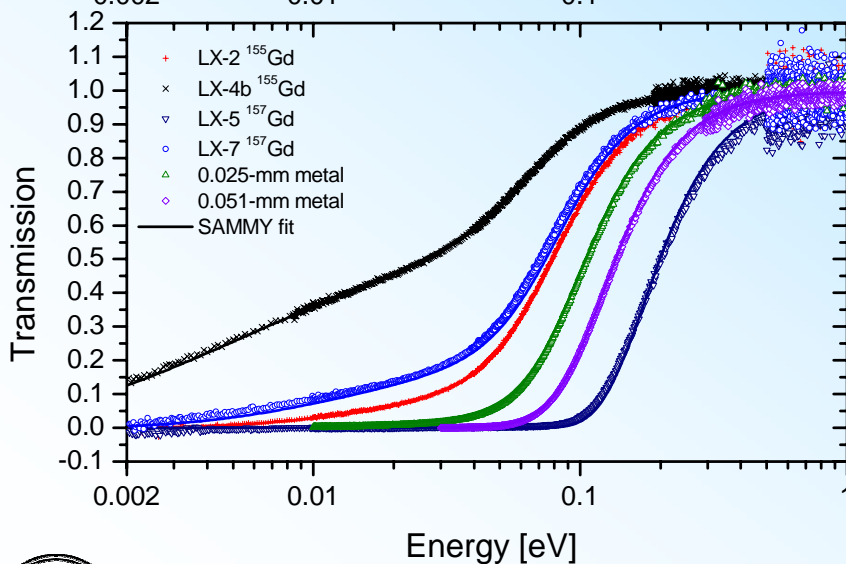
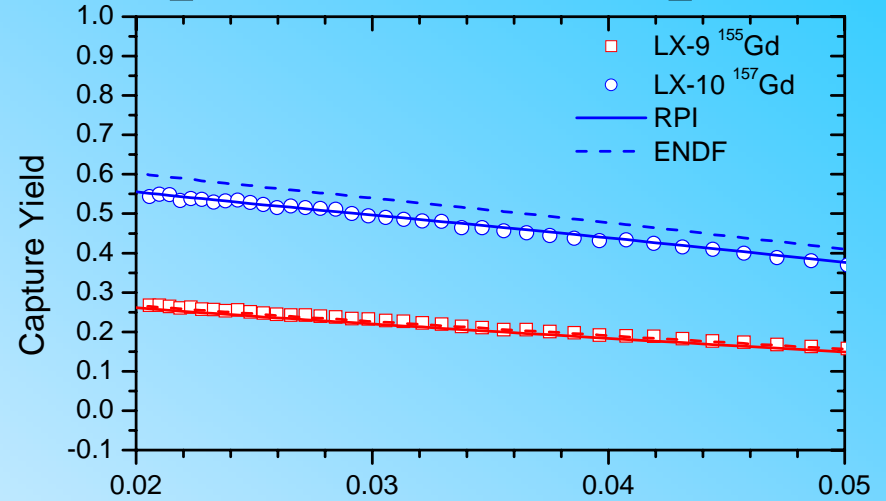
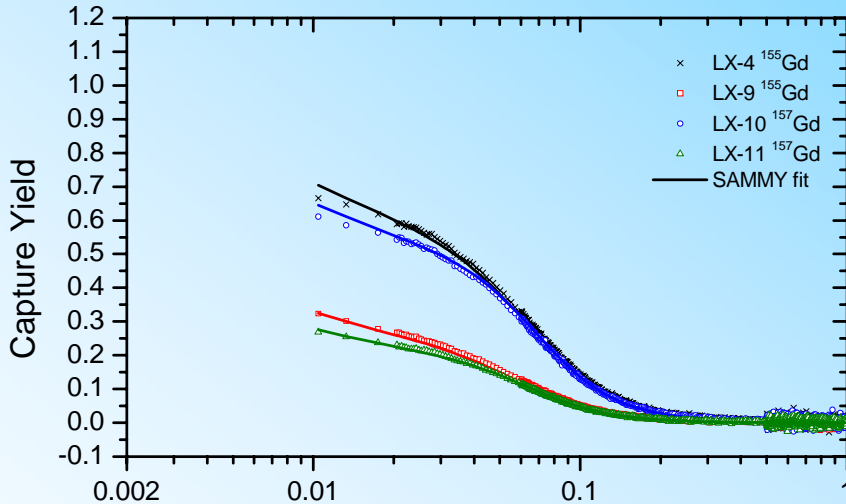
# Recent Measurements on Gadolinium



# New Gd Resonances



# Gd Thermal Region - Separated Isotopes





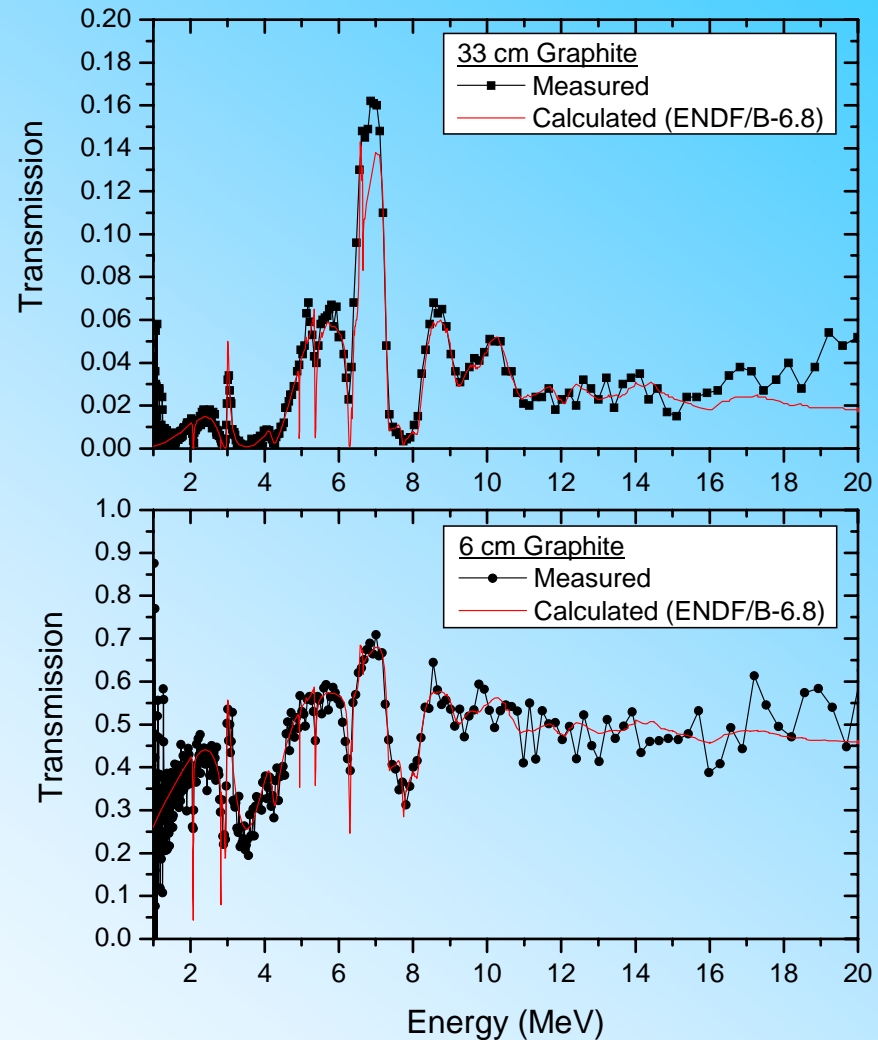
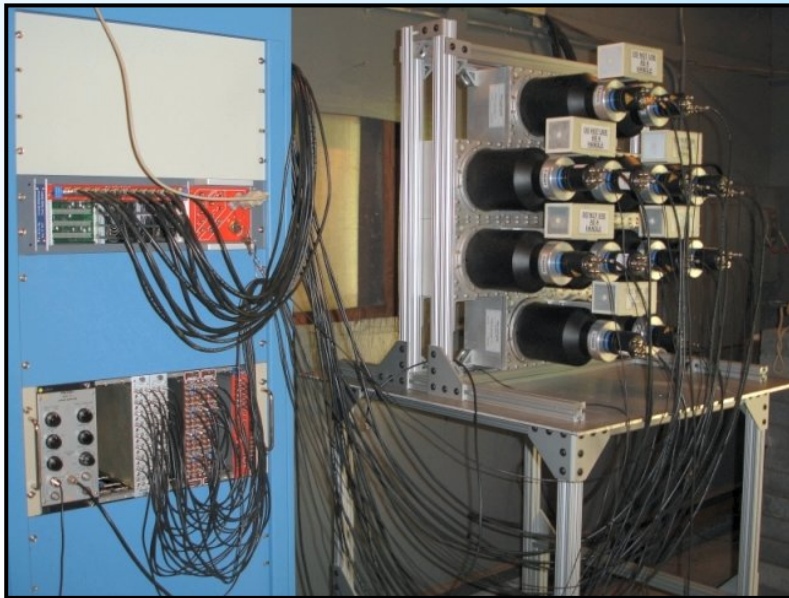
# New Capabilities

- Transmission Measurements at 100m flight station with a large Neutron Detector (~104 cm x 70 cm)
  - Allows high energy transmission and spectra measurements in the energy range 0.2-20 MeV.
- Scattering detectors at ~30m flight path for the energy range 0.2-20 MeV
  - A digital data acquisition system allows pulse shape analysis with no dead time.
- LINAC Injector Upgrade
  - Provide shorter pulses (<5 ns), higher current (several amperes peak current), better emittance, commercially available spare parts
  - Installation under way – completion expected early next year.



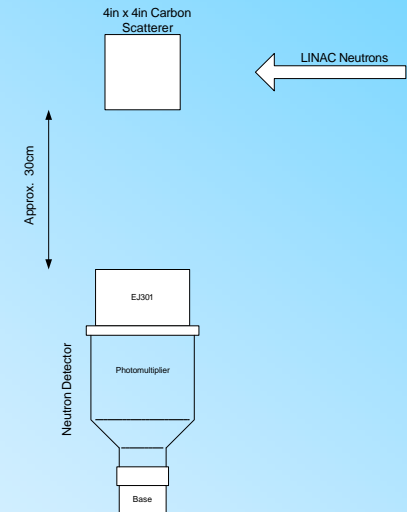
# Preliminary Measurements at 100m

- Modular EJ-301 liquid scintillator detector
- Data collected for only 20 min.
- LINAC pulse width is 40 ns, to be reduced to  $< 5$  ns after completion of new injector upgrade



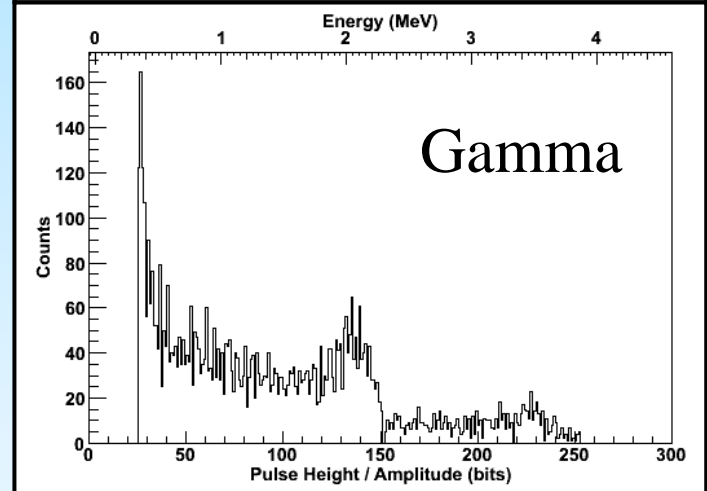
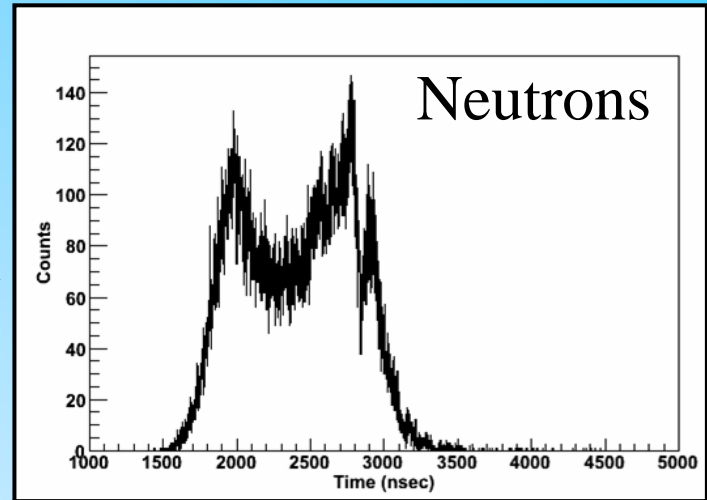
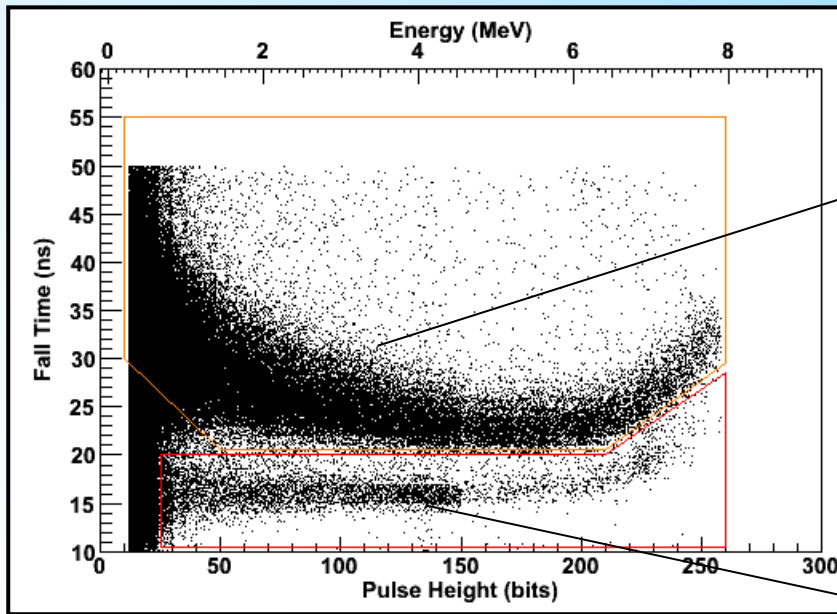
# Preliminary Tests of the Scattering System

- Experimental Setup
  - 8 EJ-301 Liquid scintillators
  - Digital data acquisition using 4 Acqiris AP-240, 1 GHz, 1 GS/s, FPGA signal analyzer boards.
- Tested at a 30m flight-path with one detector in transmission and scattering geometries

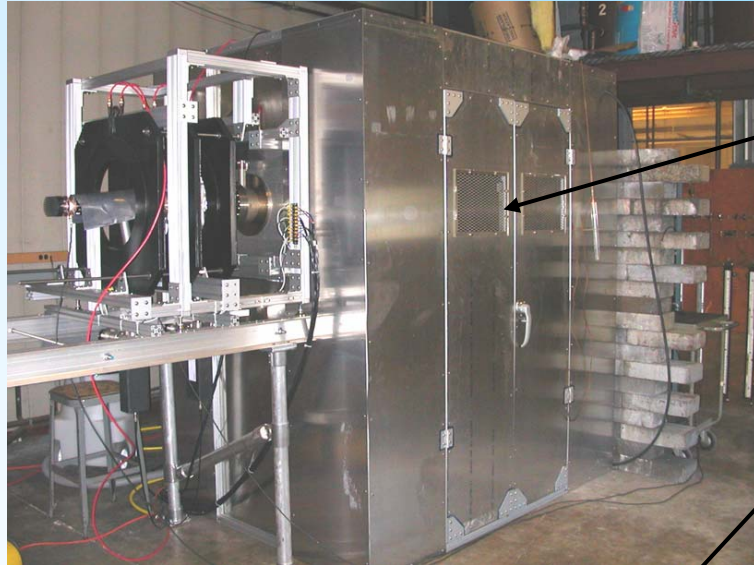


# Pulse Shape Analysis

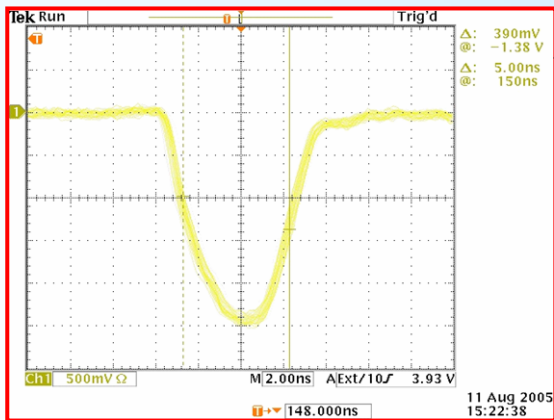
One detector in direct beam



# LINAC Injector Upgrade



- The Injector system was assembled and tested outside the LINAC room.
- A 5 ns wide pulse was successfully demonstrated.
- In order to install the new system, the LINAC is shut down for 3 months until Jan 2006.



## Summary

- New resonance parameters for Nd (accepted), Nb and Gd submitted to NS&E.
- Re, Rh and Mo measurements are currently being analyzed.
- Transmission and capture measurements of  $^{153}\text{Eu}$  is planned for the energy region from 0.01 eV to 2000 eV
- The RPI LINAC is getting ready for measurements in the energy region from 0.2-20MeV
  - Transmission
  - Scattering



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