Cross Section Measurements and Analysis at Rensselaer

Report at CSEWG 2003

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and

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Measurements Completed This Year

- Cd
  - Epithermal transmission and capture measurements (5-1000 eV), thick samples.
  - This completes our measurements for Cd.
- Rh
  - Thermal transmission and capture (0.002-20 eV)
  - Epithermal transmission and capture (1-1000 eV)

Transmission+Capture Measurements Next Year Plan

- Dy-164
  - Oxide 98% enriched powder was procured and liquid samples are in preparation.
- Develop a method to use the RPI multiplicity detector for alpha (σ_γ/σ_f) measurements.
  - Characterization of the multiplicity detector response to ^{252}Cf fission is in progress.

Future Measurements

- Develop new methods for simultaneous measurements of fission cross sections and fission fragments mass, energy, and charge distributions.
  - Multiparameter DAQ electronics was procured.
  - Double-gridded fission chamber is now being designed.
- ^{236}U
  - Transmission thermal and epithermal measurements were done with sample of 89.2% enrichment.
  - Sample with 99.8% enrichment has been located at INEEL and is being considered for capture measurements.

Analysis in Progress

Sample	Status
Gd	Analysis in final stages
Nb	SAMMY fits for thermal and epithermal capture and transmission are almost complete
Nd	Completed
Hf	Completed

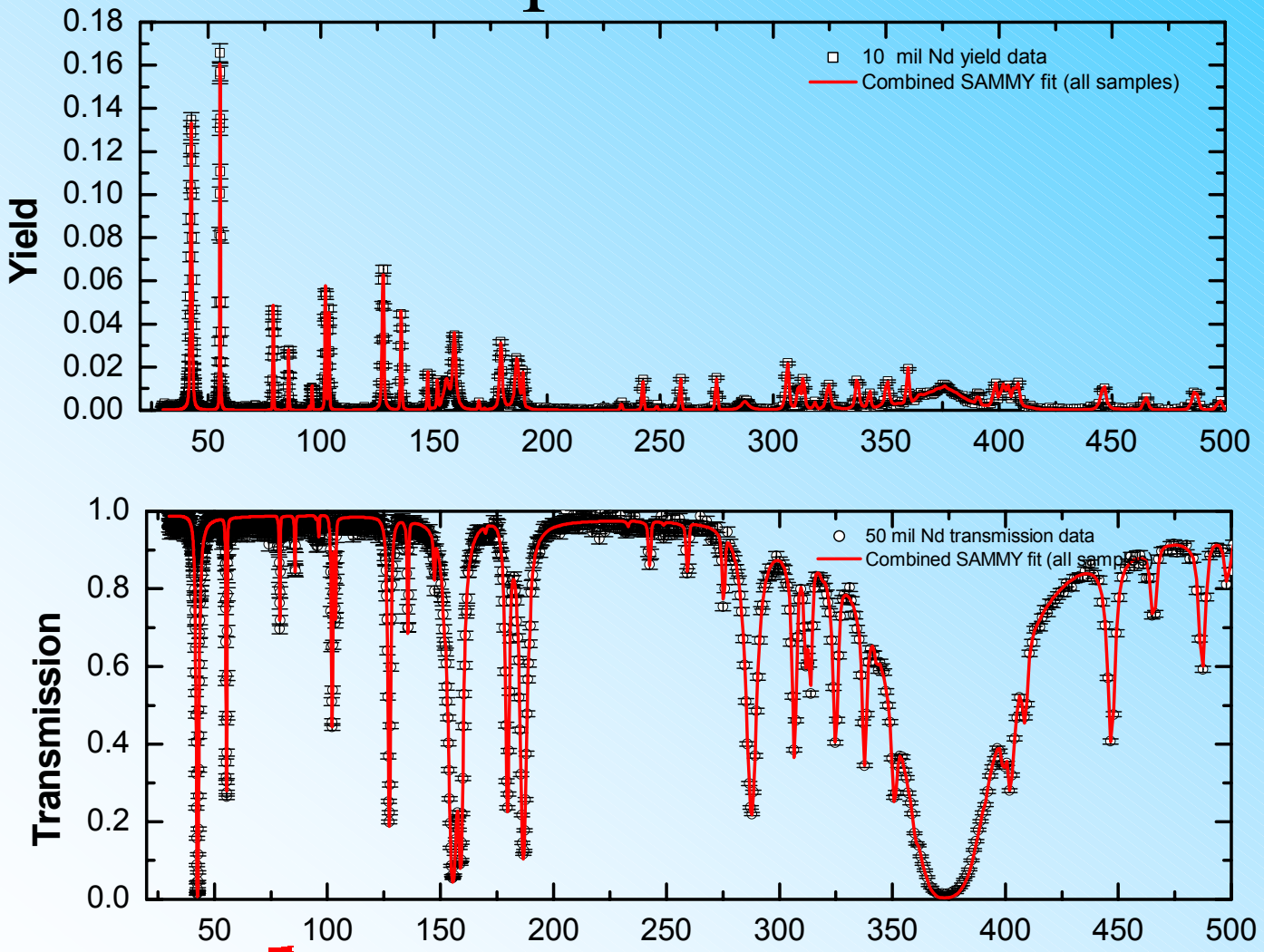
Analysis – Pending

- Mo
  - Transmission and Capture measurements completed, Analysis will start soon.
- Cs
  - CsF crystal (thick) and heavy-water-diluted Cs_2CO_3 (thin) samples, thermal and epithermal capture and transmission.
- Cd
  - Measurement completed.
- ^{236}U
  - Transmission Measurement completed.

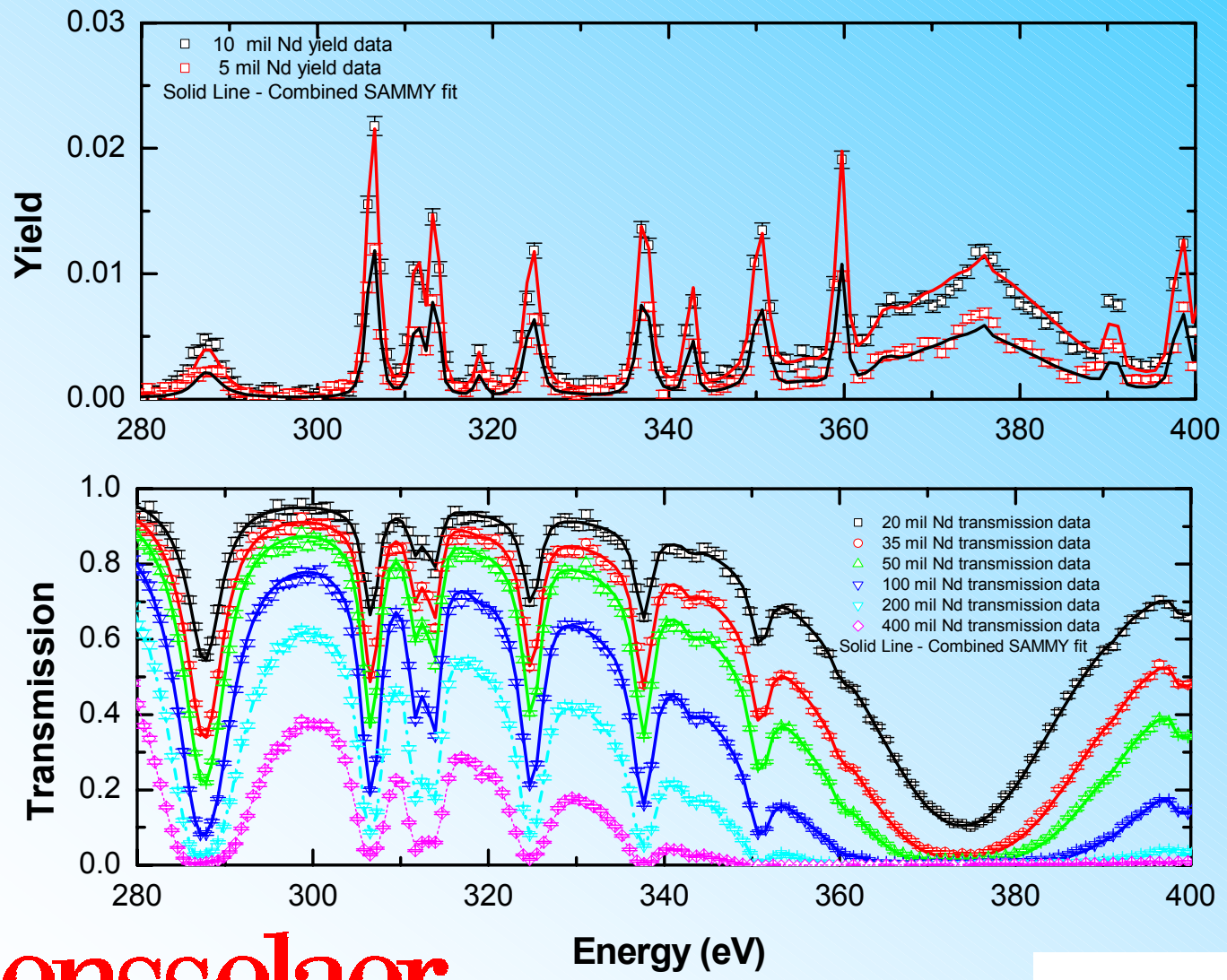
Hf And Nd Measurements and Analysis

- SAMMY fits to Transmission and Capture Data
  - Includes new fits to the resolution functions and error analysis that includes this function.
  - Simultaneous fits of all data sets, Typically:
    - Several samples for thermal transmission and capture measurements (0.005 eV - 20 eV)
    - Several samples for epithermal transmission and capture experiments (1 eV - 500 eV)
    - In the case of Hf, enriched liquid samples Hf-176 and Hf-178 were also used
- Data and Analysis details soon available in PhD theses of ***Devin Barry*** (Nd) and ***Mike Trbovich*** (Hf).

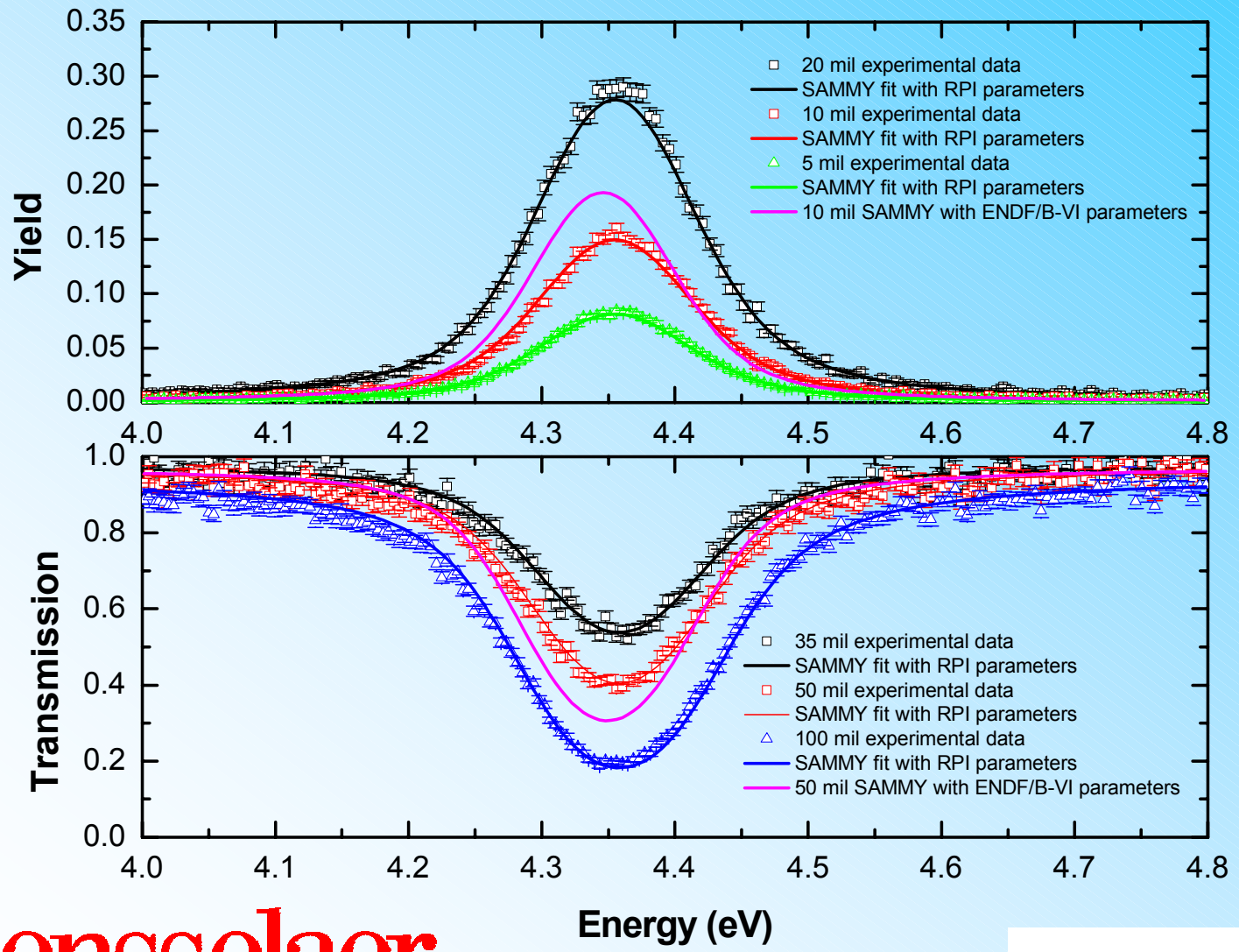
Nd Epithermal Data



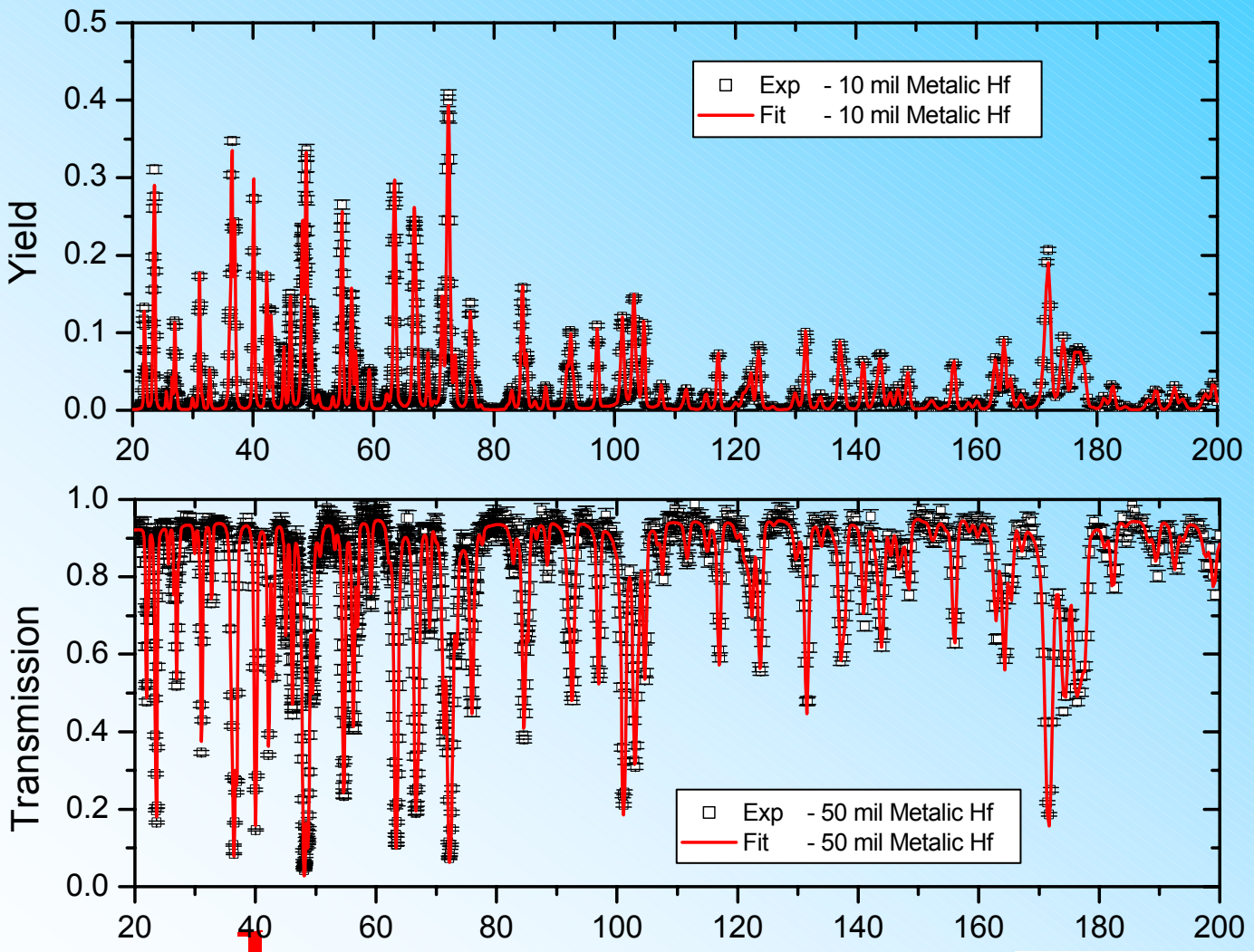
Nd Transmission and Capture Yield 280-400 eV



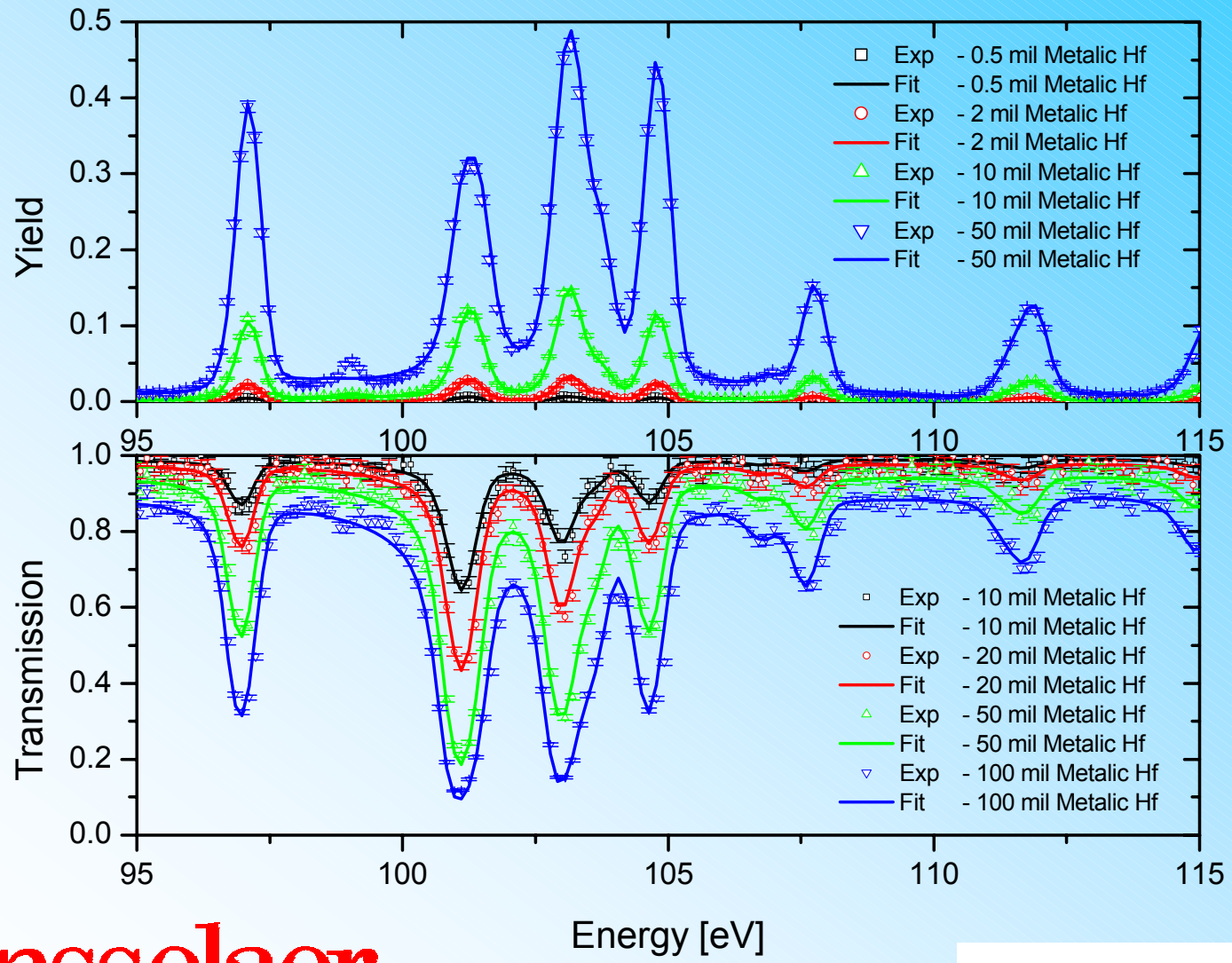
Nd 4.3 eV Resonance



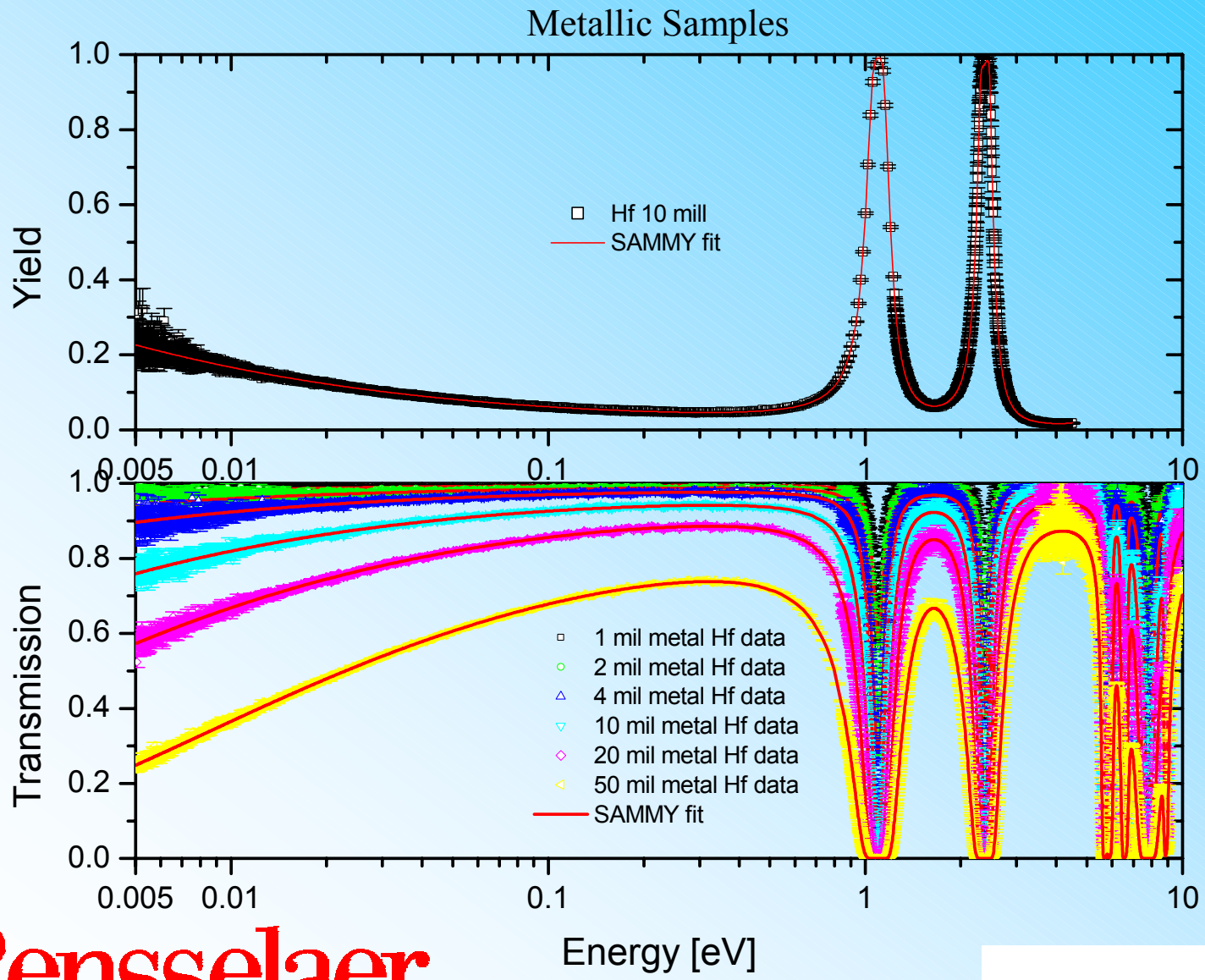
Hf Epithermal Data



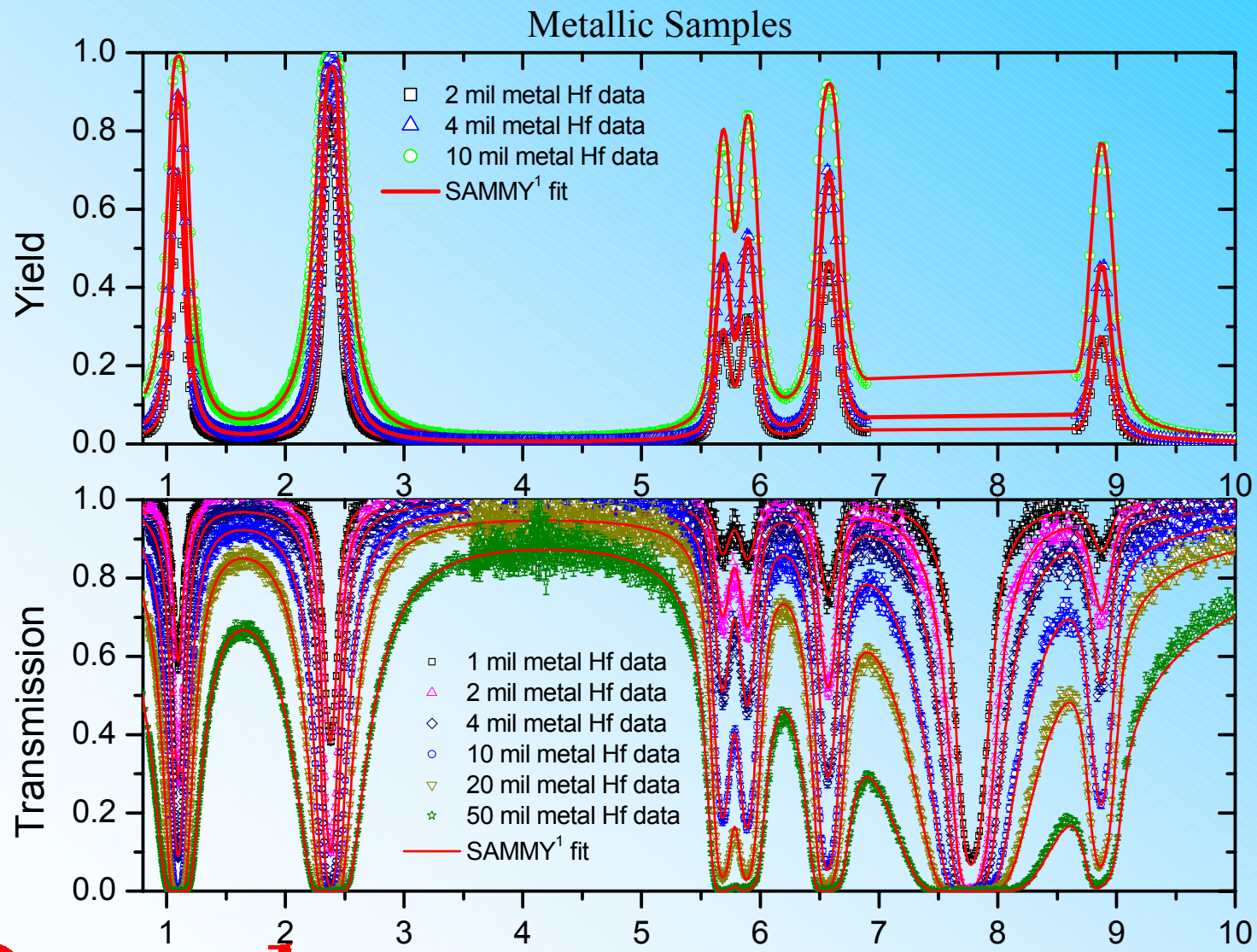
Hf Transmission and Capture Yield 95-115 eV



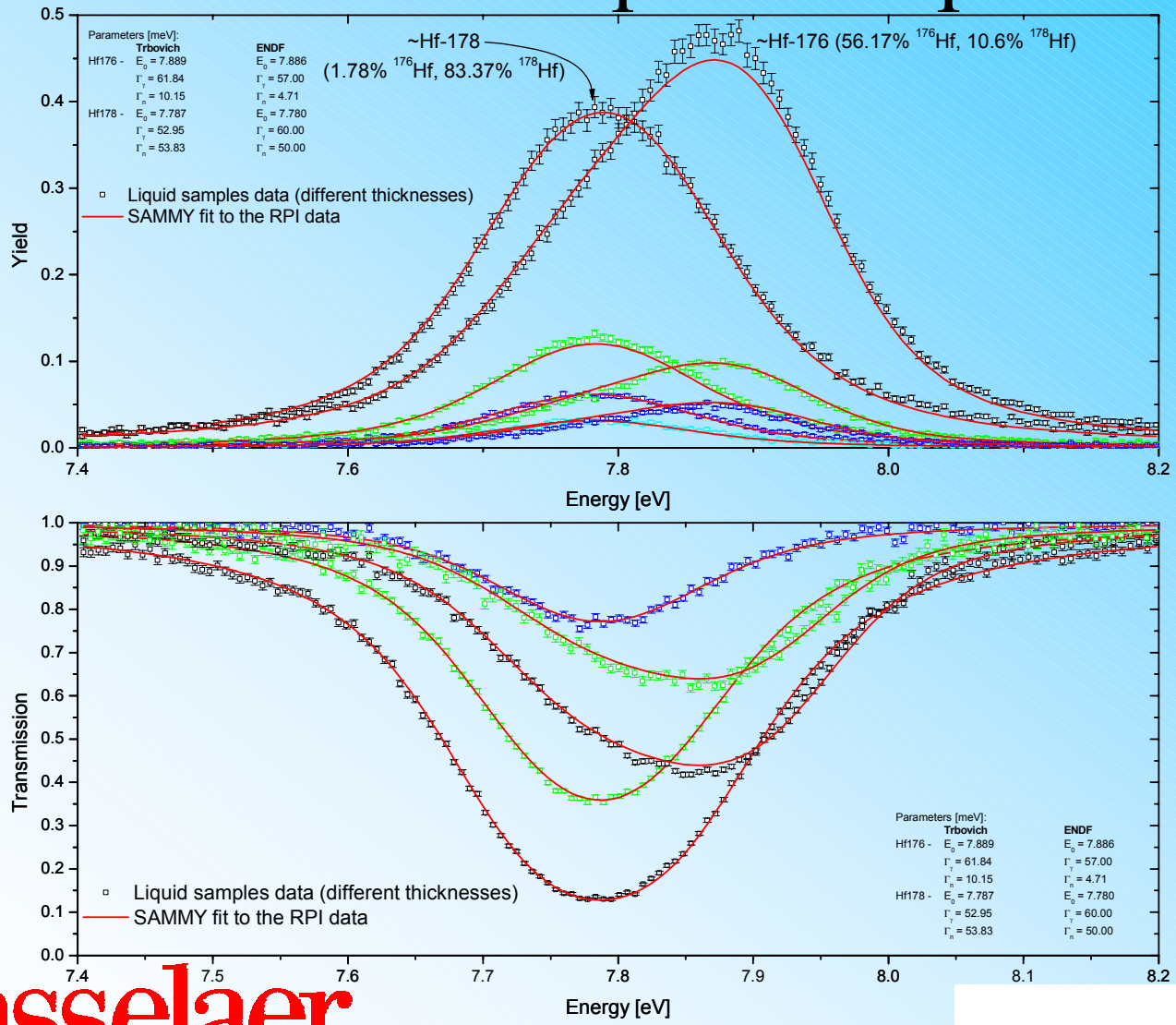
Hf Thermal Data and fits



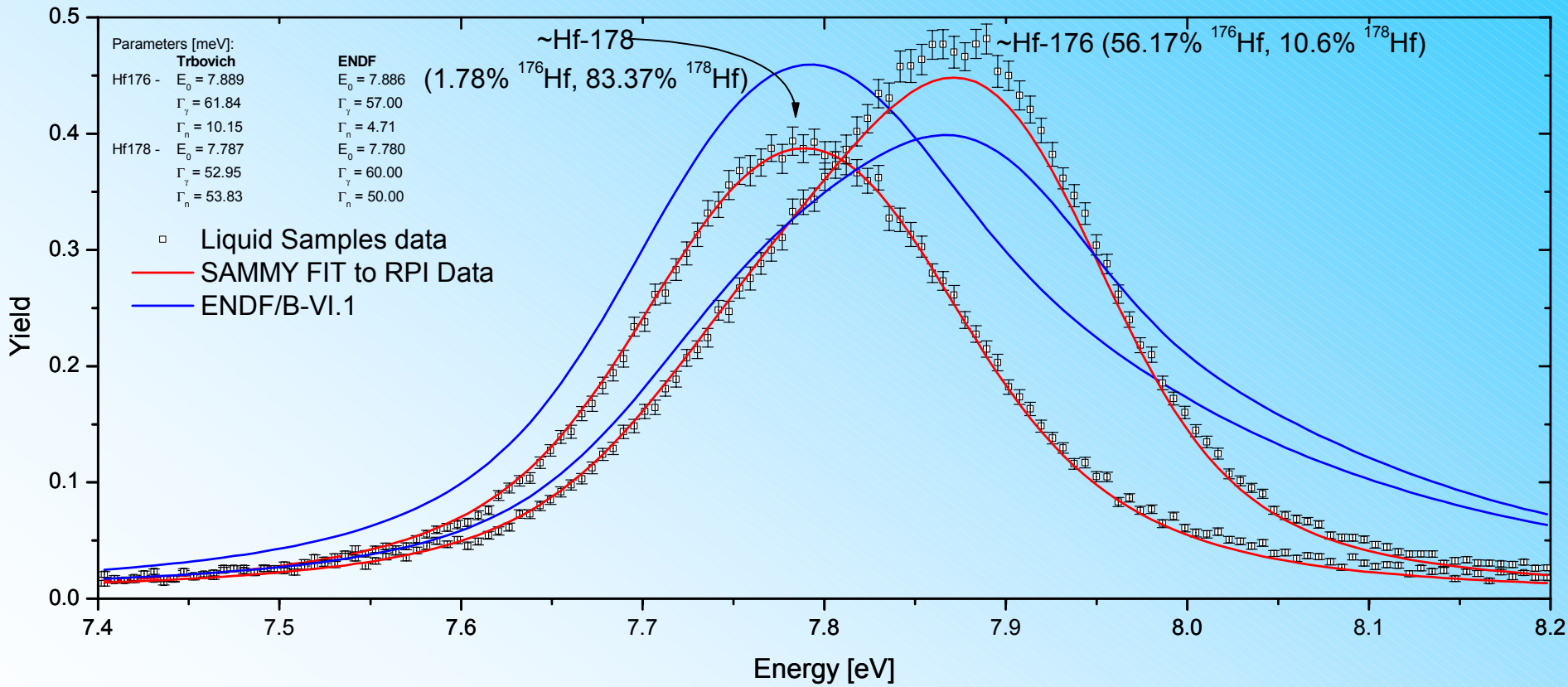
Hf – Low Energy Resonances



Hf Diluted liquid Samples



HF – Comparison With ENDF Parameters



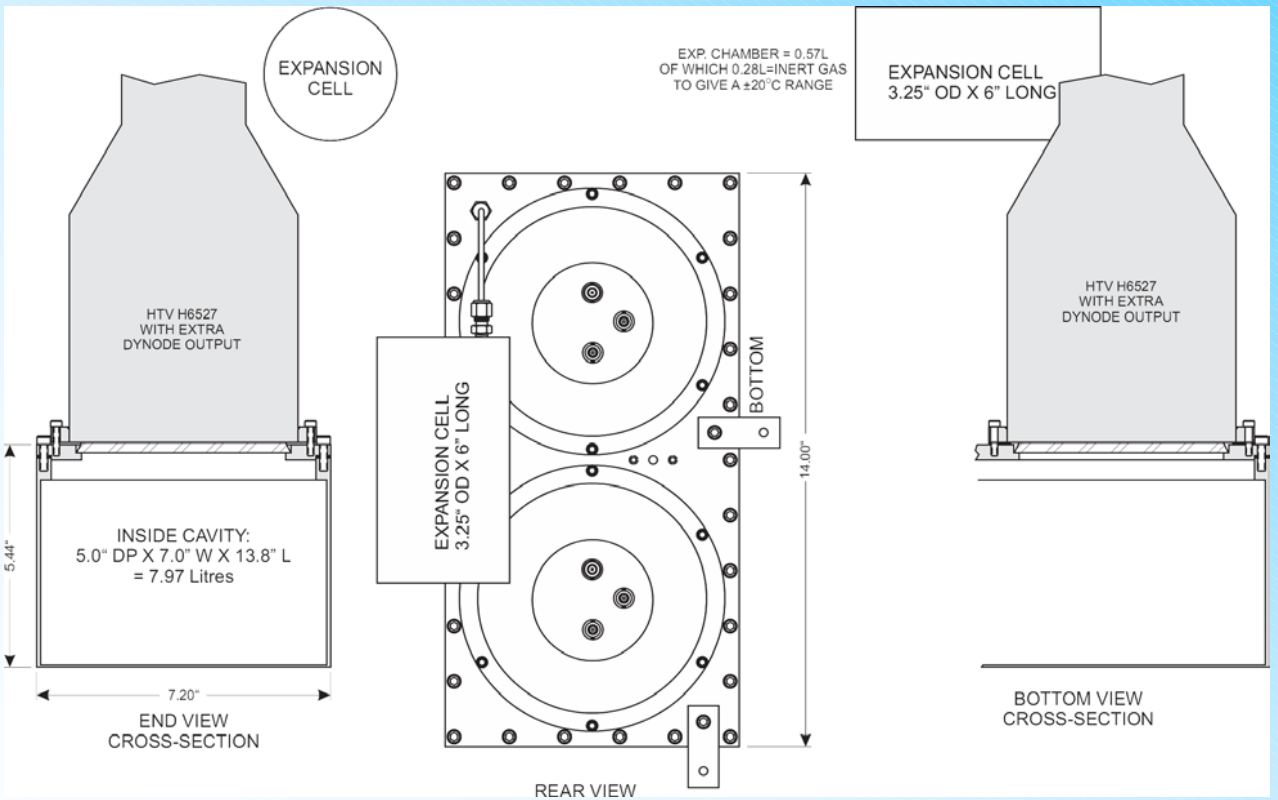
LINAC Injector Upgrade

- Objectives.
  - Provide shorter pulses (<10 ns).
  - Provide better emittance.
  - Provide spare parts.

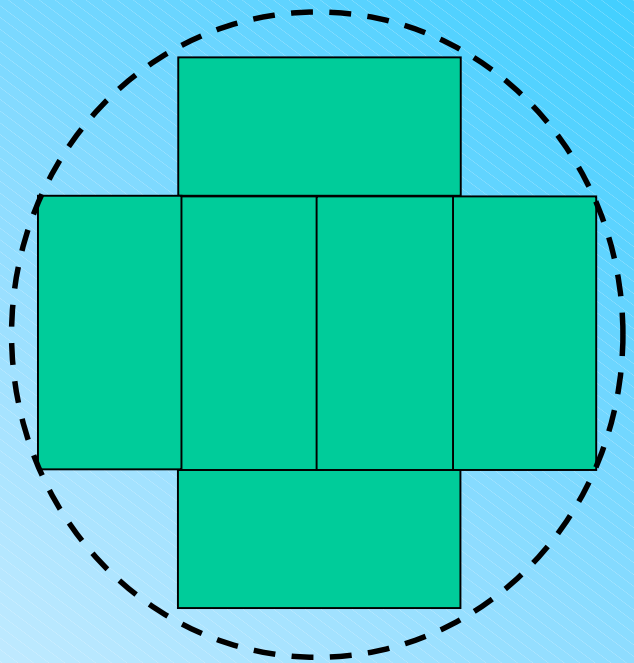
New Capabilities

- Transmission Measurements at 100 m flight station with a large Neutron Detector (~104 cm x 70 cm)
  - Allows high energy and resolution transmission and spectra measurements in the energy range 0.5-10 MeV.
  - Detector characterization and design completed.

New Detector



Stacking option



Overview of one unit out of 6

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