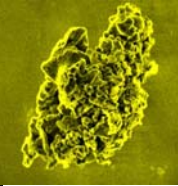


New Neutron Cross-Section Measurements from ORELA

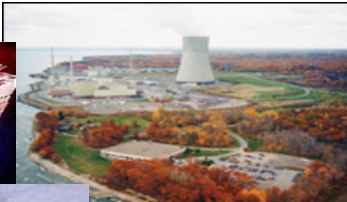
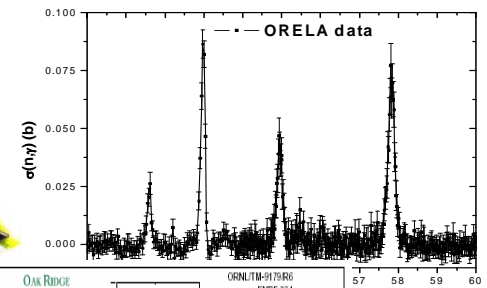
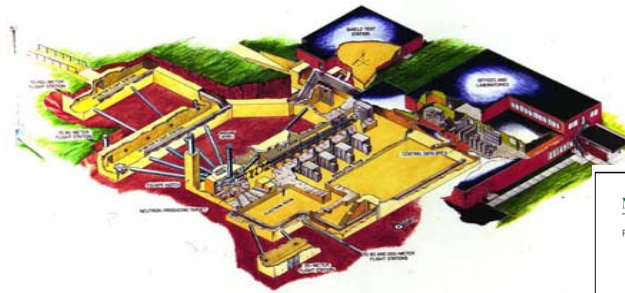
K.H. Guber, P.E. Koehler, D. Wiarda, J.A. Harvey,
R.O. Sayer, T.S. Bigelow, C. Ausmus, D.R. Brashear,
R.B. Overton, J.A. White

Oak Ridge National Laboratory,
Oak Ridge, TN, USA

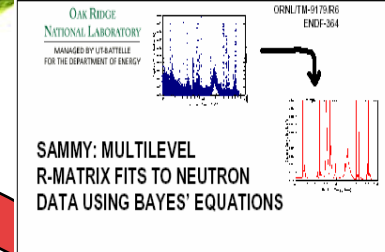


Nuclear Astrophysics

ORELA



Basic Science



SAMMY

Cross-Section Evaluations

ORNL Data Support for Nuclear Applications

Applications

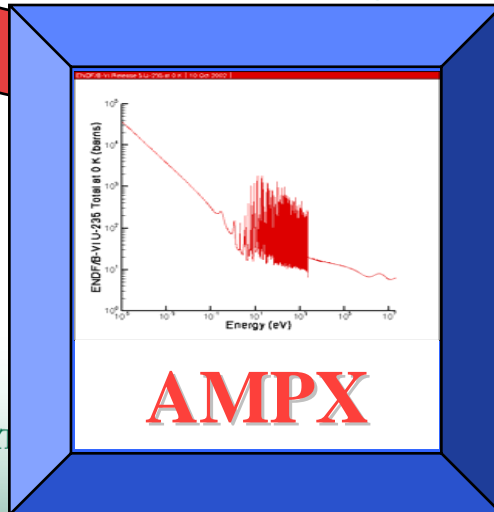
Evaluated Nuclear Data Files (ENDF/B)

NNDC

Computational modeling

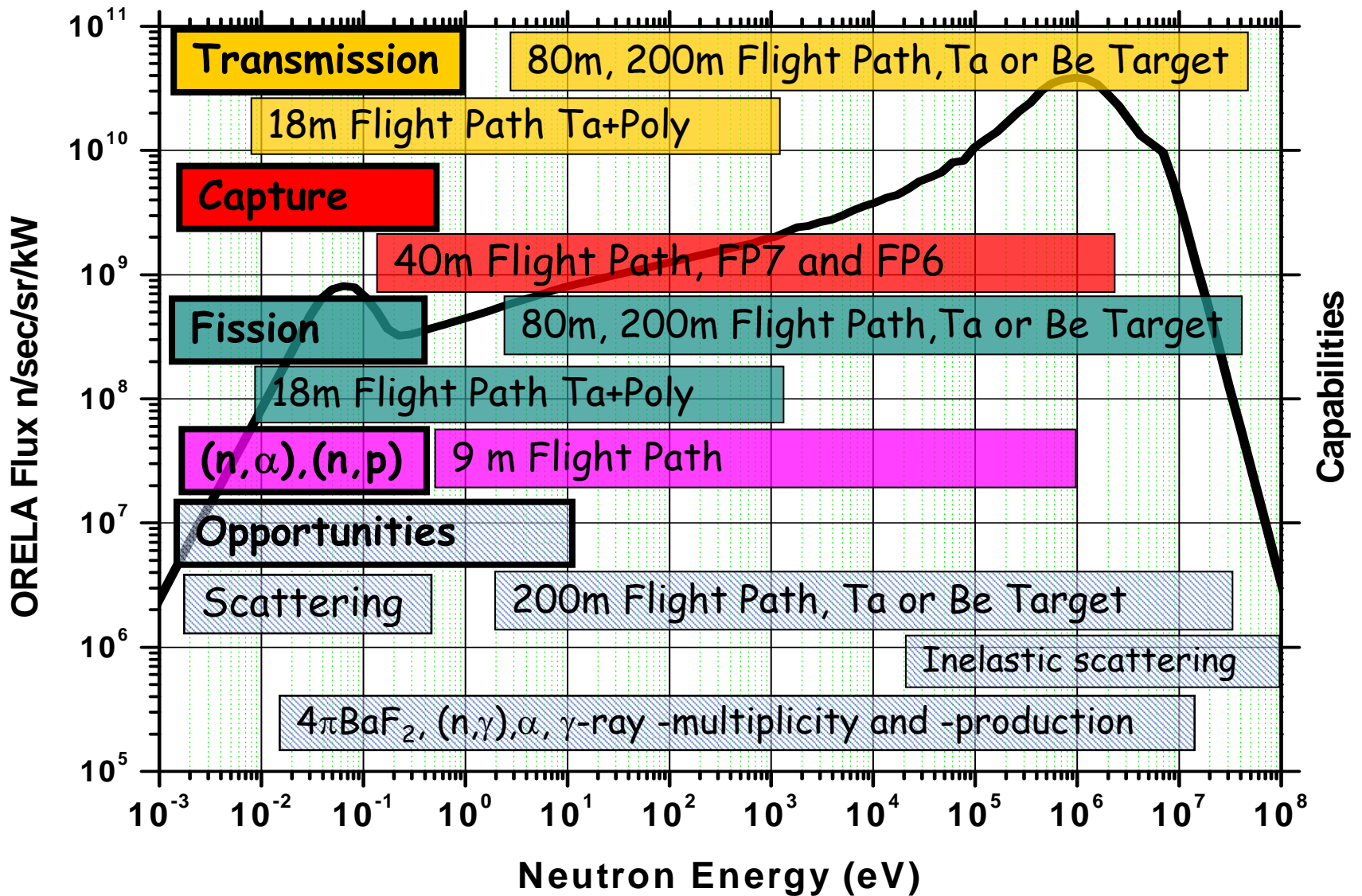
<http://www.ornl.gov/scale>

SCALE

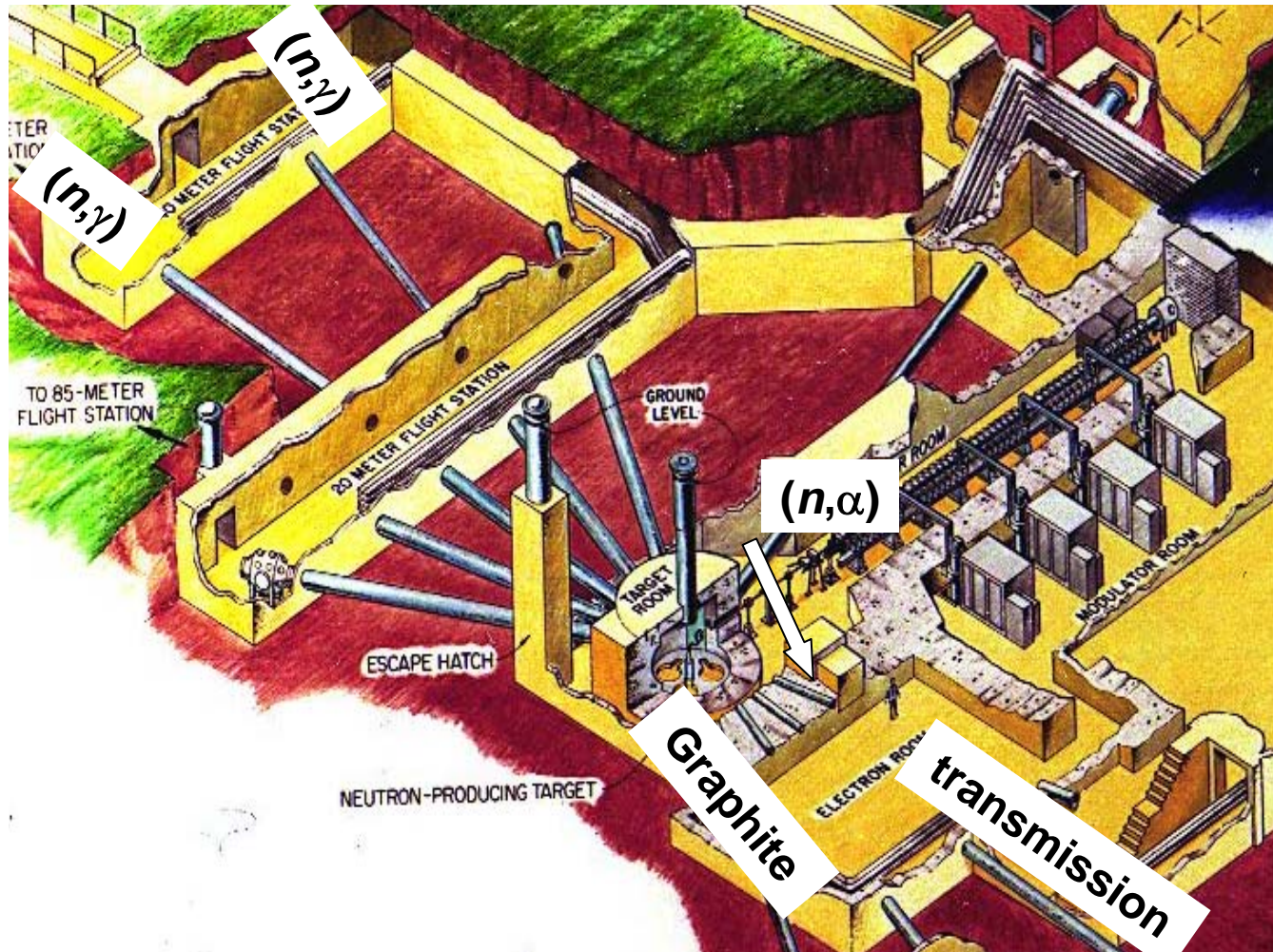


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Existing Experiments at ORELA



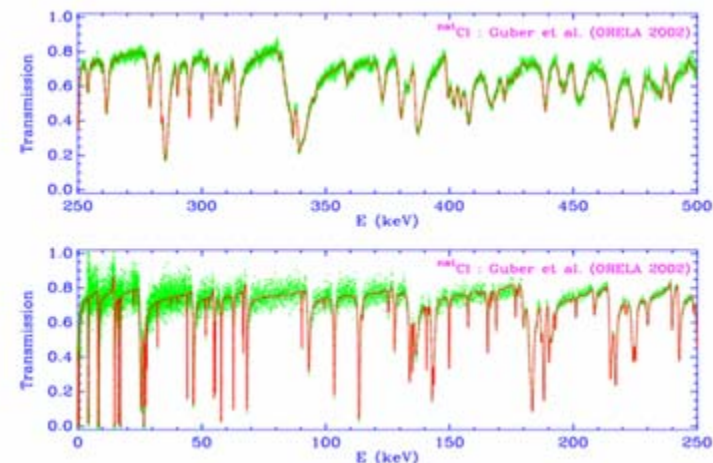
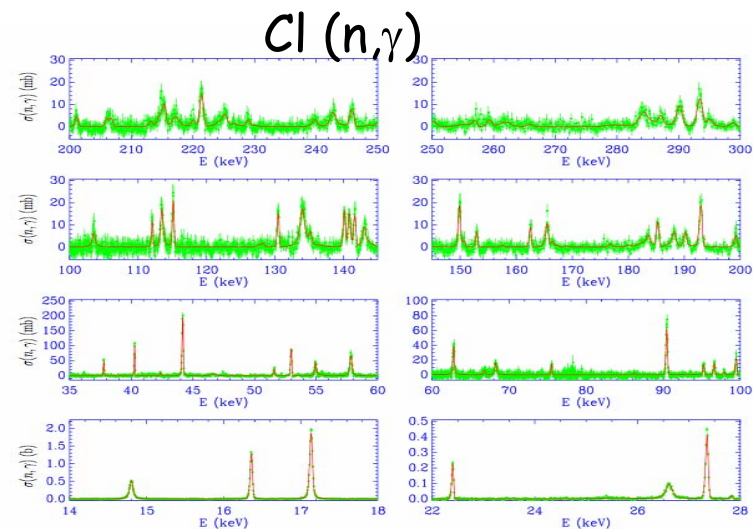
- 11 Flight paths
- Flight Stations:
 - 8-18, 20, 35, 40, 85, 150, and 200 m

New NCSP Measurements

- Completed ^{41}KCl capture and transmission.
- Measured Mn capture using thick sample (0.018at/b).
- Started natural Cr transmission (energy range 100eV to 50 keV), good high energy data available. Completed capture on natural Cr.
- Started capture on ^{58}Ni , good transmission data available.

New ORNL Evaluation for Cl helps to extract ^{41}K parameters

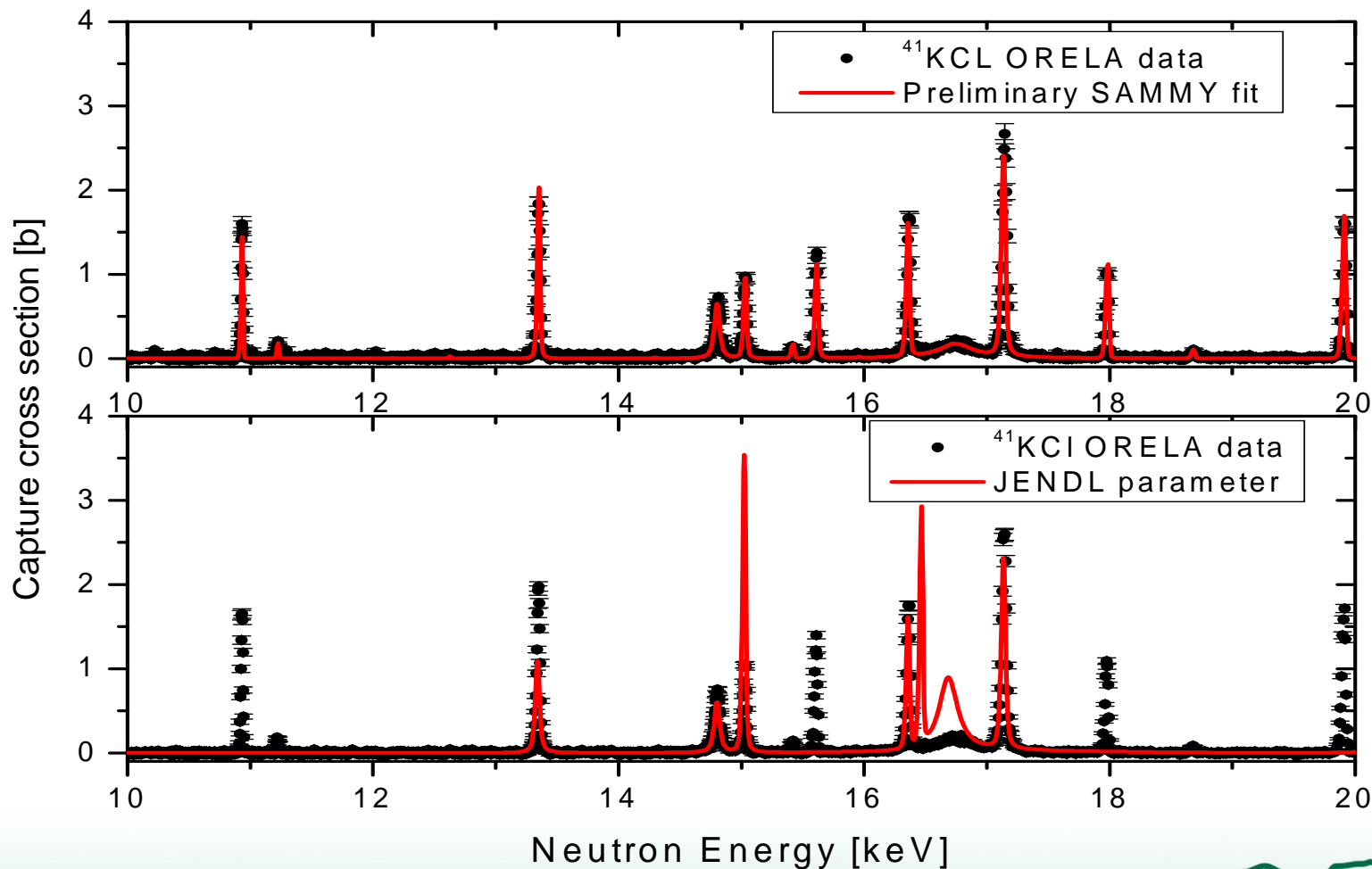
- ^{41}KCl sample used with 99.17% enrichment. (0.00797at/b)
- Including the new resonance parameter set from the ORNL Cl evaluation it will be possible to extract reliable parameter for ^{41}K .



Cl transmission

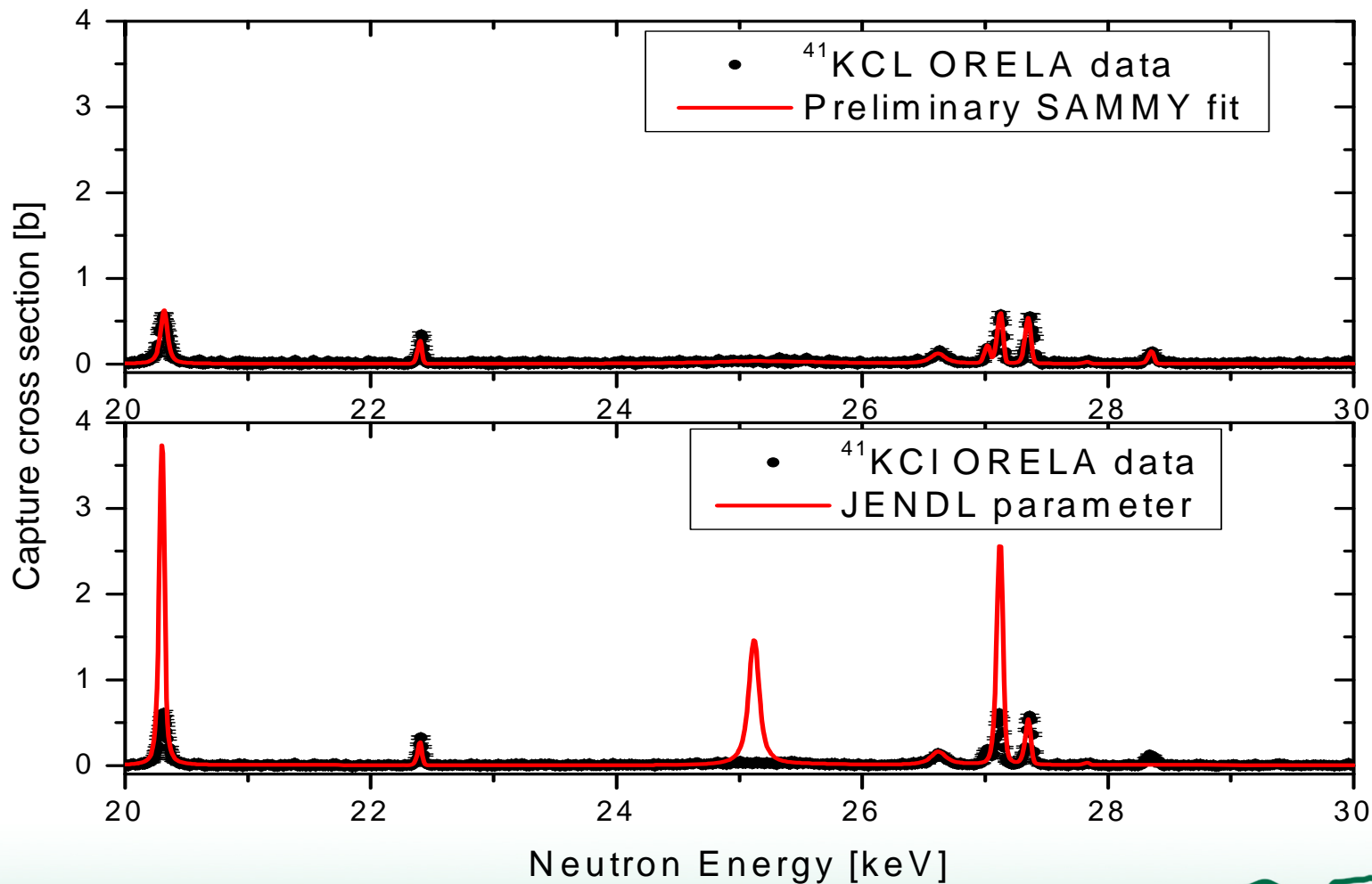
ORELA capture data for ^{41}KCl compared to JENDL3.3 and Preliminary SAMMY fits.

Several resonance areas too large (neutron sensitivity) in evaluation



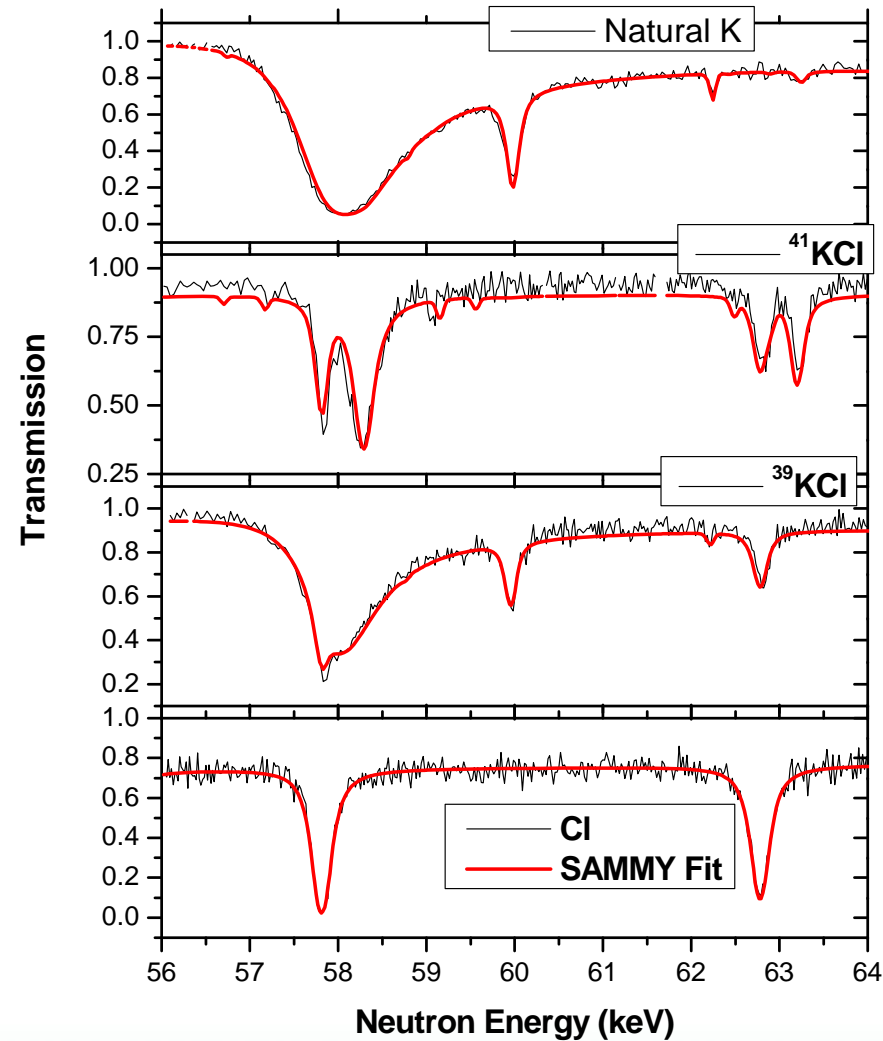
ORELA capture data for ^{41}KCl compared to JENDL3.3 and Preliminary SAMMY fits.

Several resonance areas too large (neutron sensitivity) in evaluation



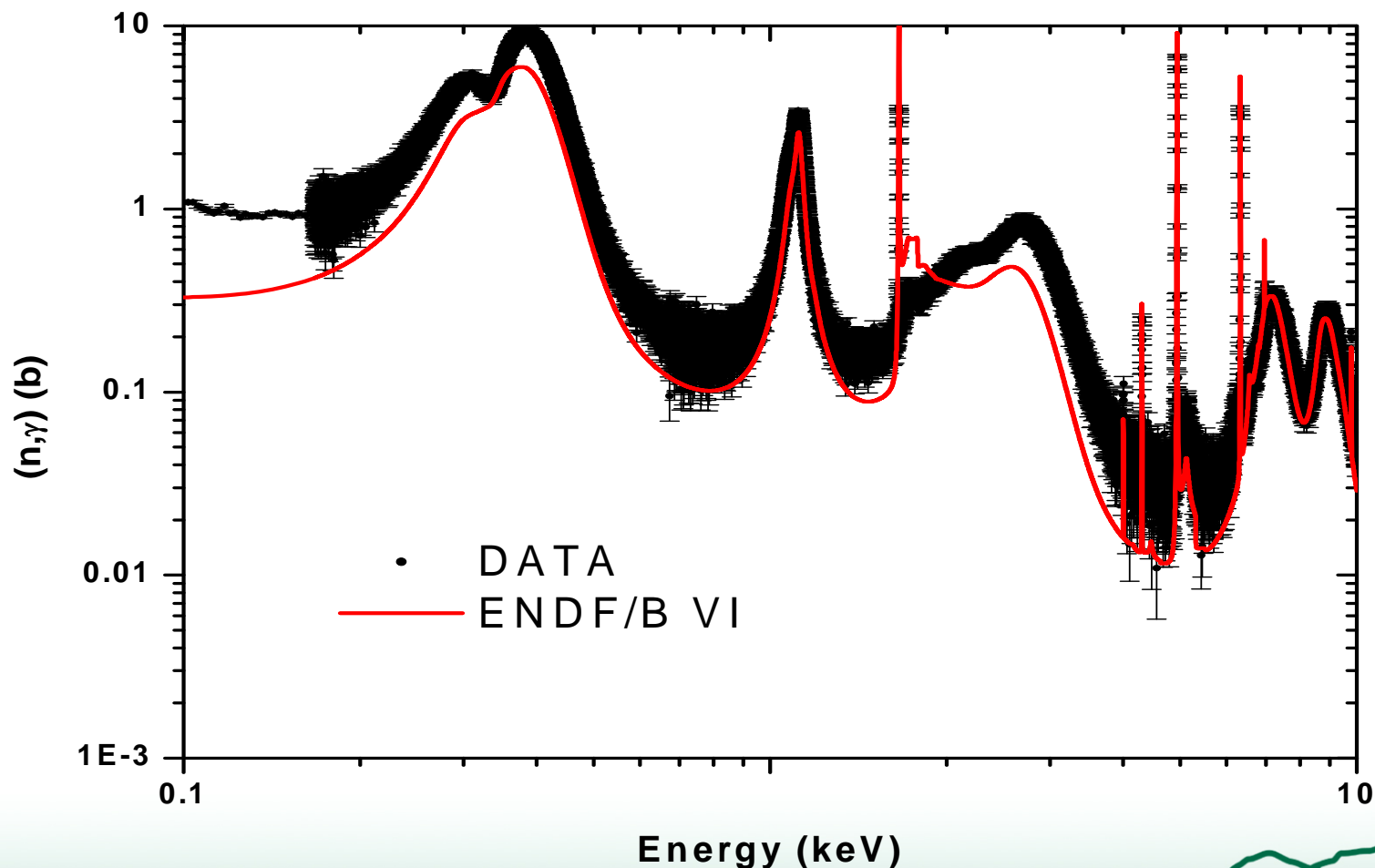
Preliminary fit to the Transmission data of metallic K and $^{41,39}\text{KCl}$

- Preliminary SAMMY fits to the transmission data of the $^{39,41}\text{KCl}$ samples and natural metallic K.
- With the use of the resonance parameter from the most recent *Cl* evaluation (Sayer et. al. Phys. Rev. C) it is possible to extract reliable *K* parameters.

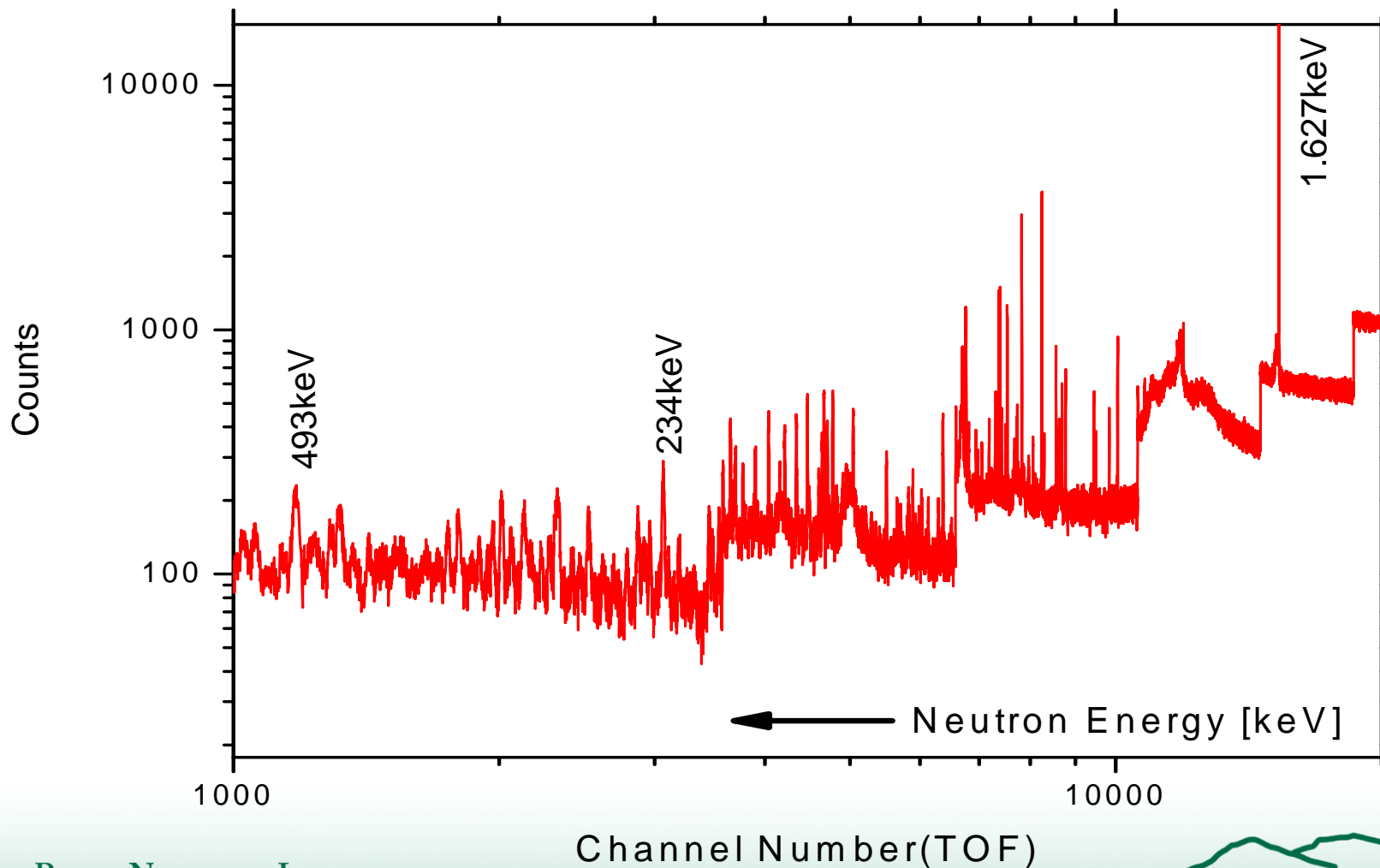


New ORELA Mn Neutron Capture compared to ENDF/B VI Evaluation

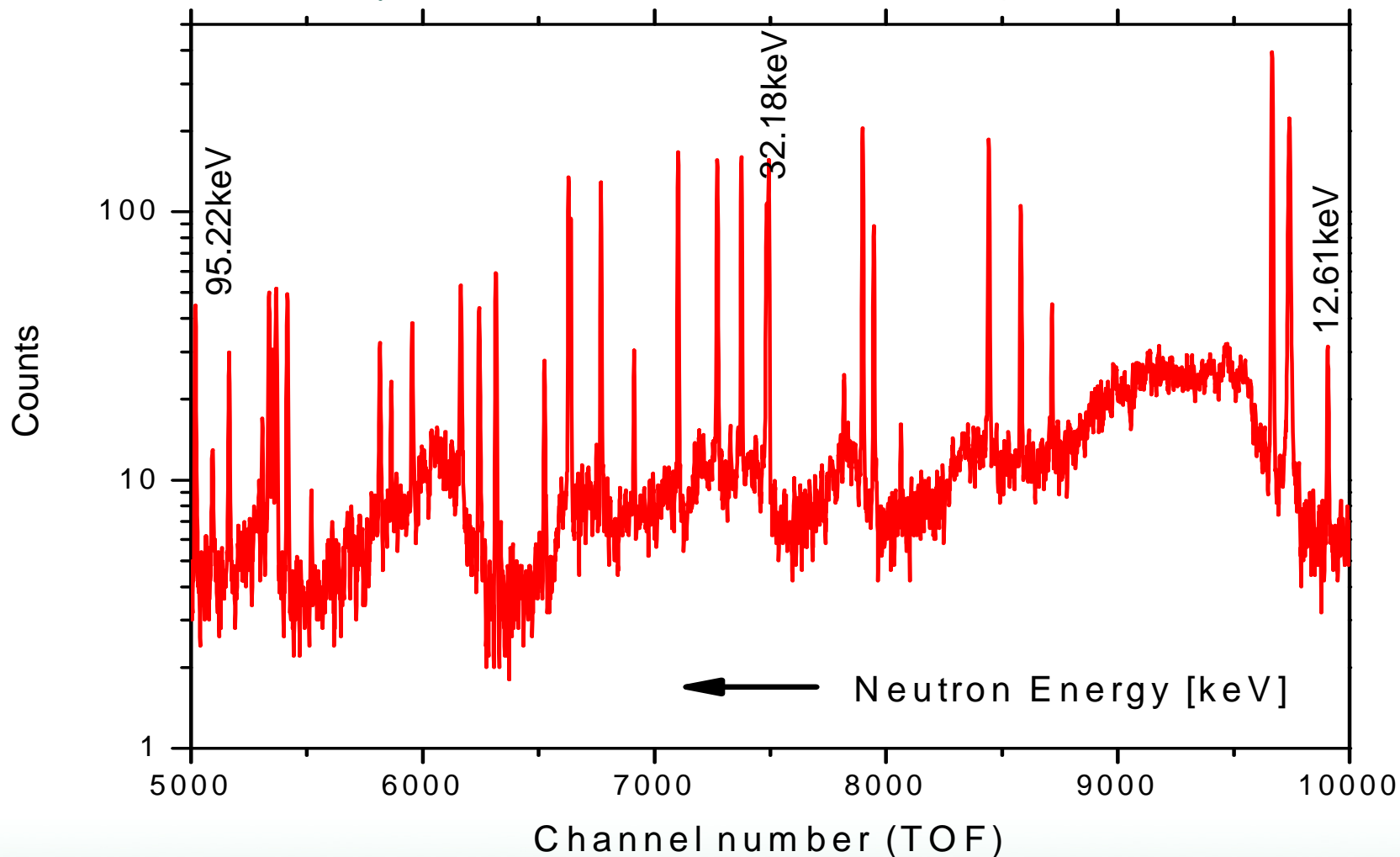
Very thick sample used, multiple scattering effect enormous



New ORELA ^{52}Cr Capture TOF data; using a metallic sample

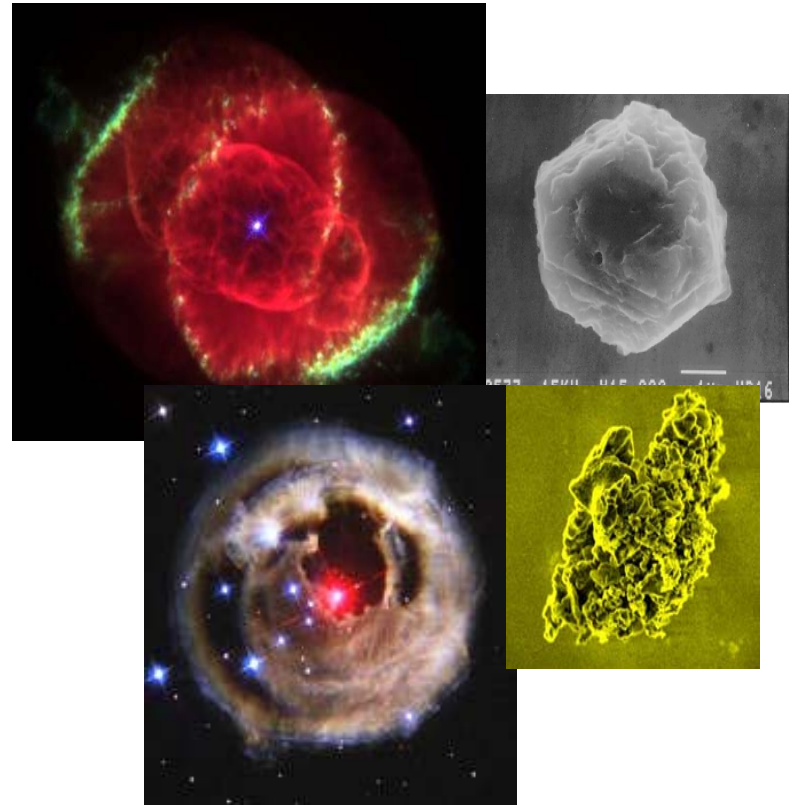


New ORELA ^{58}Ni Capture TOF data; using a metallic sample; 8 hours running time

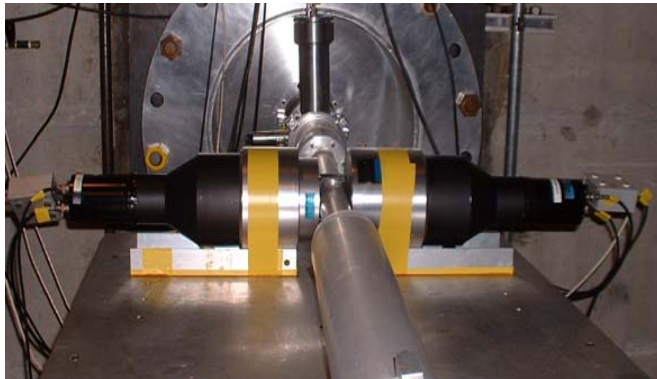
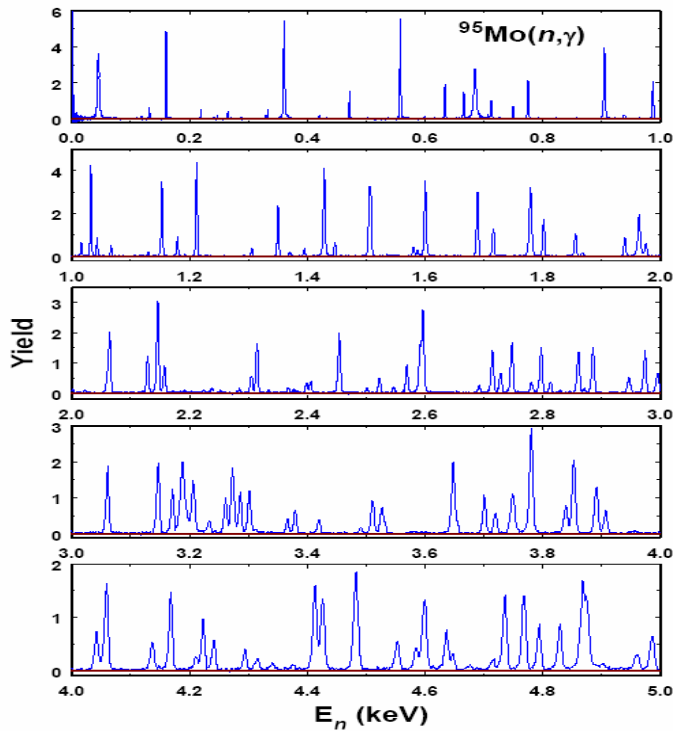


New $^{95}\text{Mo}(n,\gamma)$ experiments

- AGB stellar models over predict the abundance of ^{95}Mo compared to observation in SiC grain which origin from an AGB star where the s-process takes place.
- M. Lugaro et. al. 2003: calculations show a 30% enhancement in the (n,γ) cross section for ^{95}Mo would solve the problem.



New C_6D_6 Apparatus on FP6 in 40-m Station



Old set up

- New system for (n,γ) experiments built in collaboration with JNC.
- Improved set up compared to last year. Less structural material. Two new C_6D_6 -detectors.
- $L = 38.5$ m, 2.5-cm diameter beam at sample.
- ^6Li -glass flux monitor.
- First test measurement: $^{95}\text{Mo}(n,\gamma)$. Finished!
- Completed transmission measurements.

Outlook

- Perform or finish new total and capture cross section measurements for the NCSP, i.e. nat. Cr, ^{53}Cr , ^{58}Ni , ^{60}Ni , ^{63}Cu , ^{65}Cu
- Continue nuclear astrophysics experiments
Finish $^{64}\text{Zn}(n,\alpha)$
Future experiments include (n,γ) and σ_+ for $^{86,87}\text{Sr}$ and $^{149}\text{Sm}(n,\alpha)$