OAK RIDGE National Laboratory

ORNL TSL Evaluations for ENDF/B-IX

Chris W. Chapman, Kemal Ramic, Iyad Al-Qasir

Oak Ridge National Laboratory

Mini-CSEWG meeting – 14 August 2024

ORNL is managed by UT-Battelle LLC for the US Department of Energy

U.S. DEPARTMENT OF ENERGY

Outline

- What we've already done
- What's actively being worked on
- What's planned to be worked on

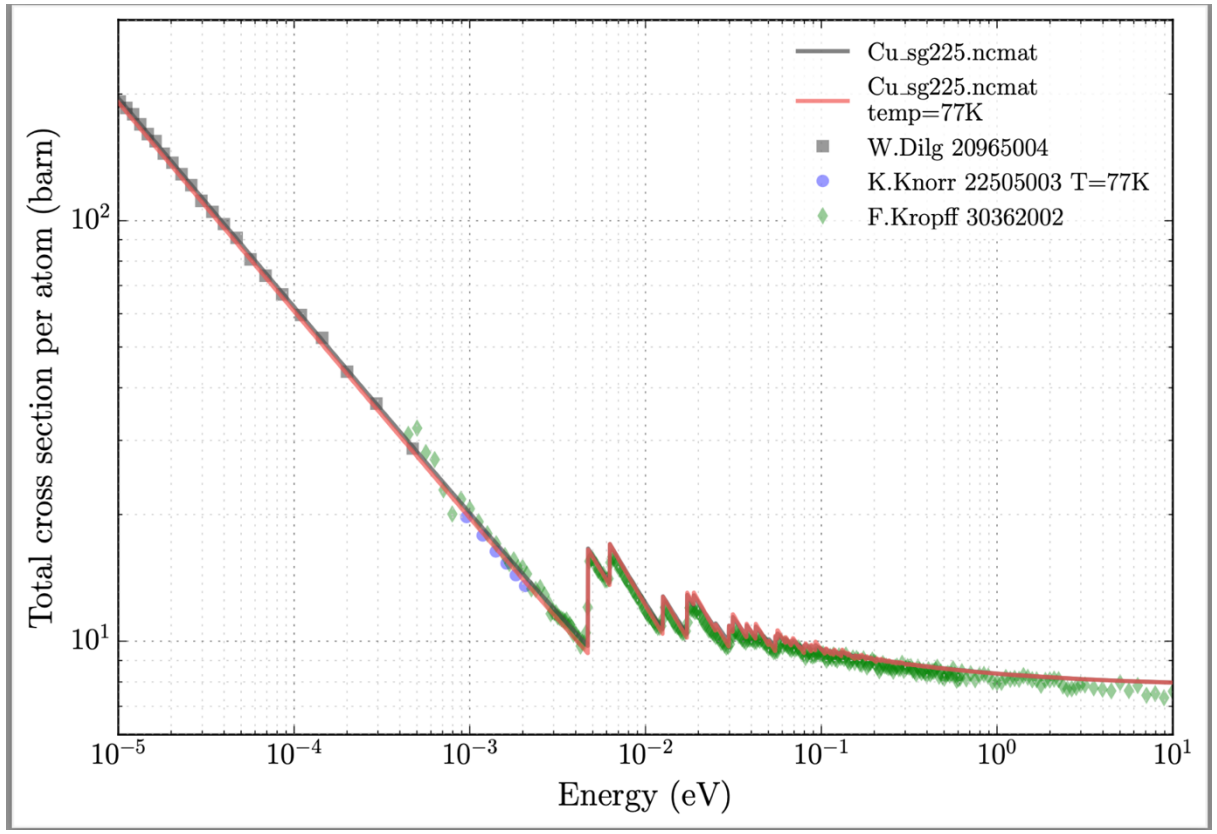
Disclaimer

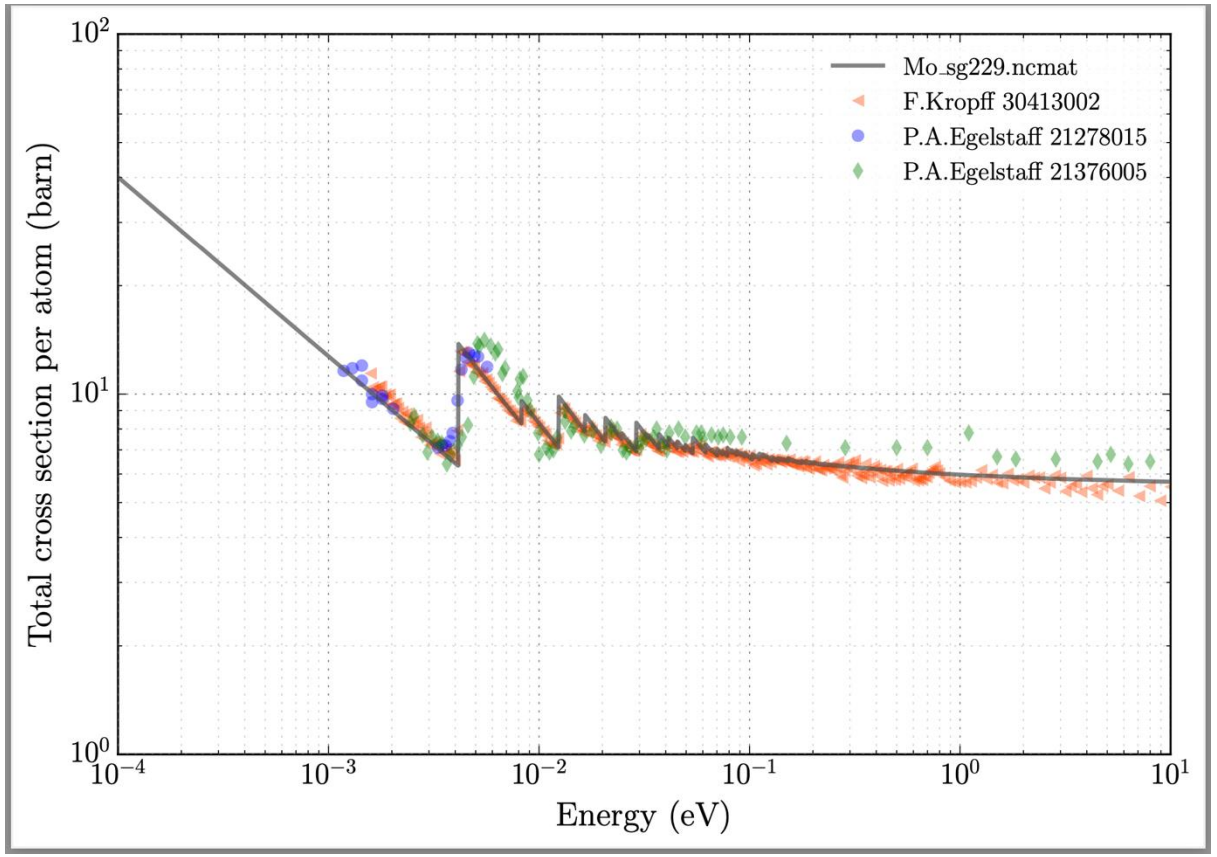
- This is not a finalized list of evaluations that will 100% for sure be submitted to NNDC
- This is just a list of what we currently expect, this is not a final list

What we've already done

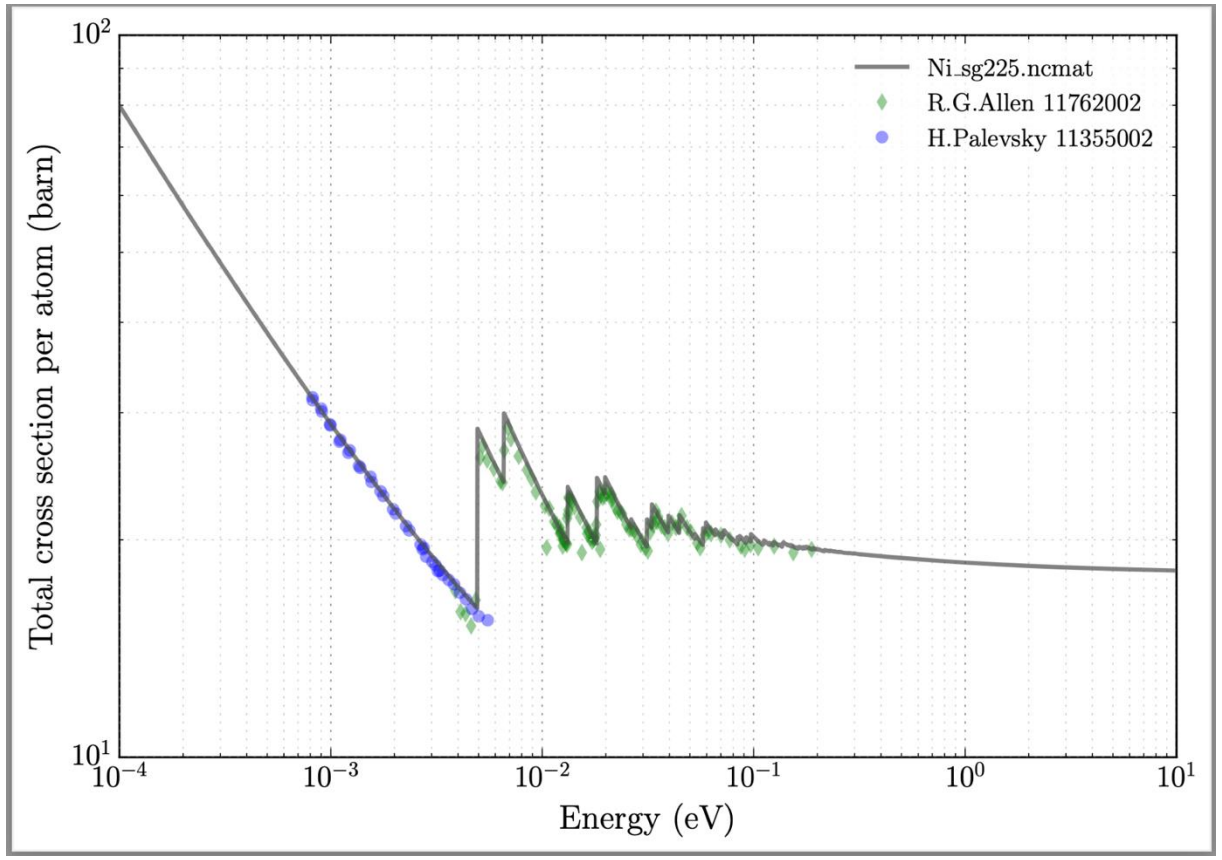
- Atomistic TSLs
  - 6 materials (W, V, Pb, Ni, Mo, Cu) are under consideration
    - Originally from NJOY+NCrystal collaboration
  - These materials show up in numerous ICSBEP benchmarks
  - Preliminary agreement to total cross section measurements was good, but felt improvements could be made
  - New transmission measurements planned for certain materials
  - Slight modifications are underway to ensure better agreement with cross section measurements
  - Next step is to do large scale, extensive testing across VALID suite

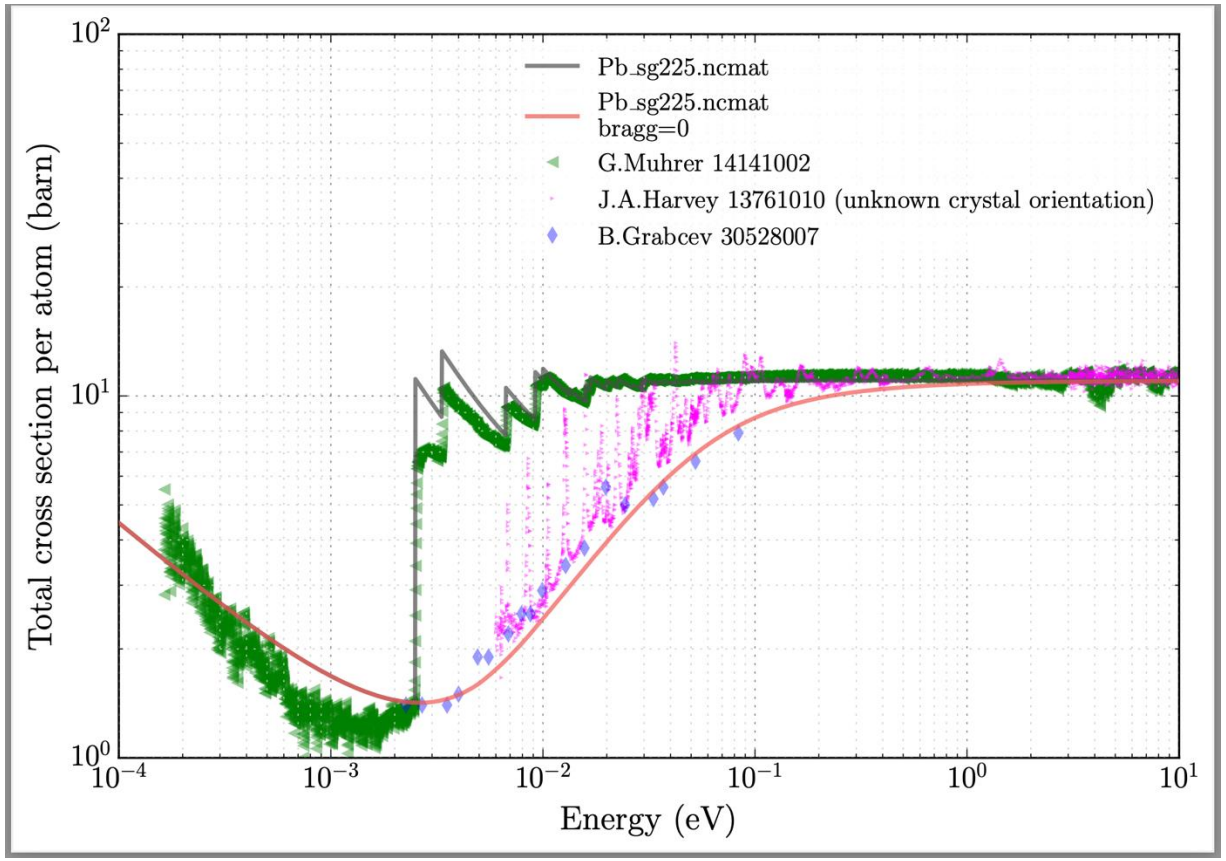
What we've already done – Cu & Mo



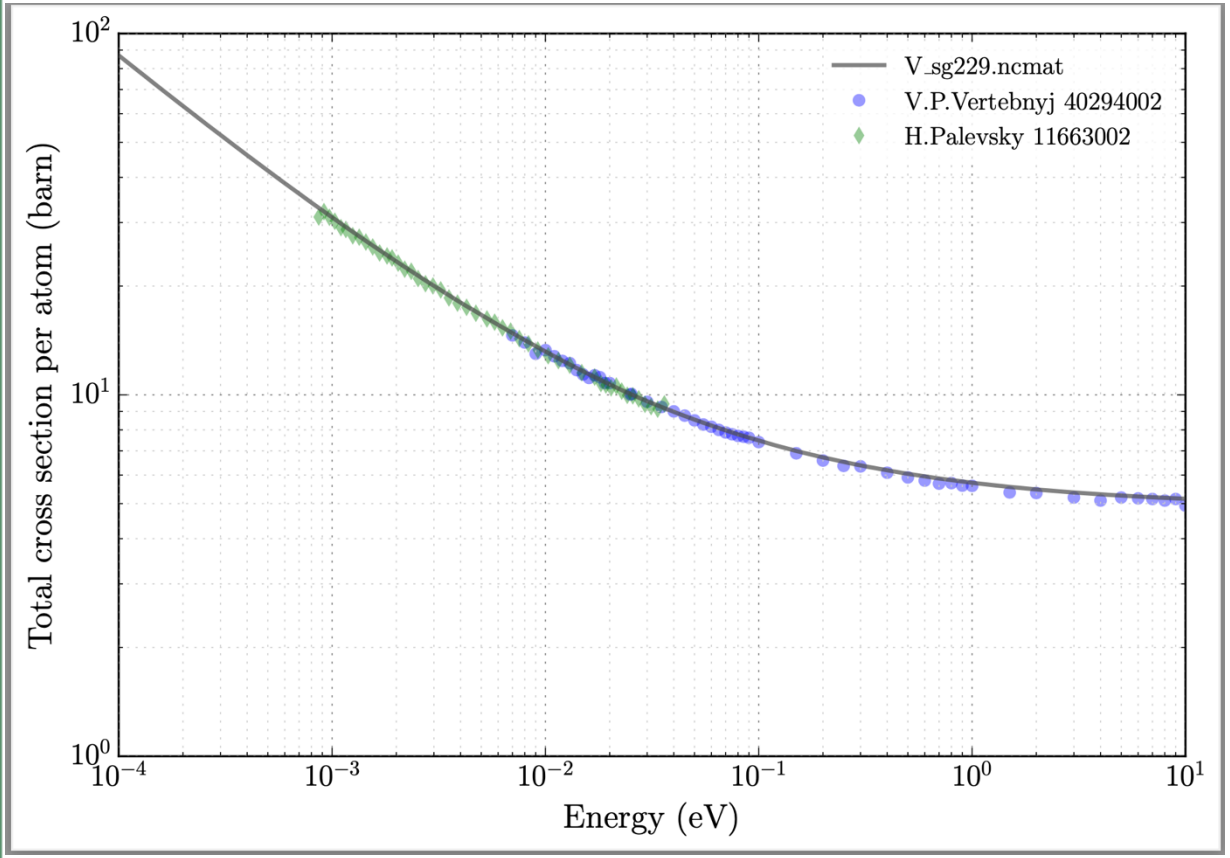


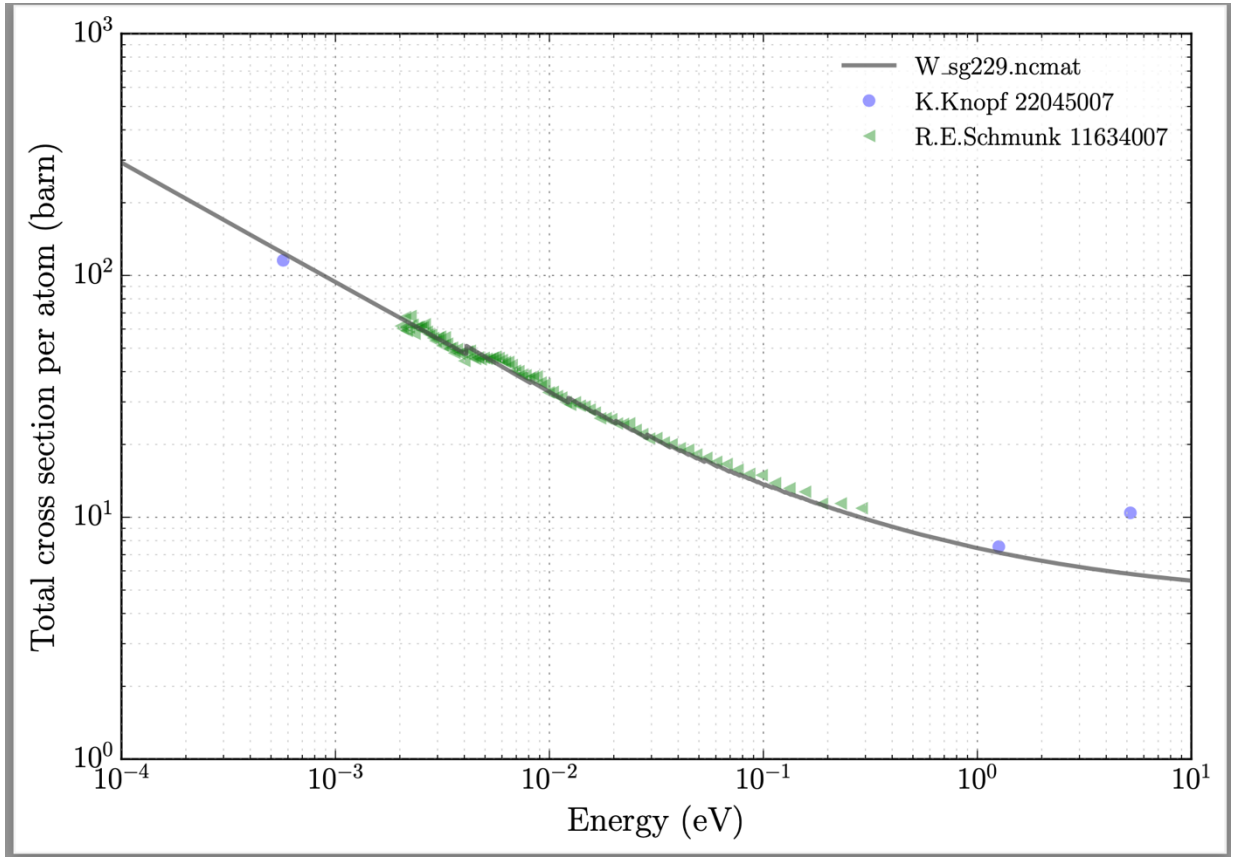
What we've already done – Ni & Pb





What we've already done – V & W





What's actively being worked on

- Polyethylene
  - Unanswered questions about discrepant agreement between differential & integral data
  - In-depth analysis into potential causes of this discrepancy is ongoing
- UO_2, PuO_2
  - Simultaneous TSL & RRR evaluation which appropriately accounts for thermal resonances
    - Unclear if new ENDF format will be required
  - No differential measurements currently planned
  - Extensive testing on integral benchmarks planned
- YH_2
  - Focus on high-temperature measurements and evaluation

What's planned to be worked on

- Graphite, MgO, SiC, ZrC, BeO, Be_2C
  - Focus is on high-temperature measurements and evaluations for advanced reactor applications
- MgO, BeF_2, MgF_2
  - Focus on temperature-dependent files for neutron filter applications
    - Special care will be used to make sure neutron filter MgO is named differently from advanced reactor MgO files
- H_2O
  - HOPEFULLY with a novel TSL covariance

Acknowledgements

- This work was supported by the Nuclear Criticality Safety Program, funded and managed by the National Nuclear Security Administration for the Department of Energy.