

LLNL 2021 Report for USNDP

Nuclear Data Week, December 2021

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LLNL contributions to USNDP

- 0.25 FTE for \$138k
- Coordinate LLNL nuclear data efforts with CSEWG
- Make, Verify, Validate R-matrix evaluations
 - With IAEA, R-matrix workshops, and GNDS-interchange codes
 - Apply Machine-Learning methods to R-matrix modeling.
- Leverage LLNL programmatic funding to provide evaluations for inclusion in ENDF

FY21 Metrics Table

NSR Compilations	0
EXFOR Compilations	0
XUNDL Compilations	0
ENSDF Evaluations submitted	0
ENDF Evaluations	1 review
Disseminations (in thousands)	0
Articles	0
Reports	0
Invited Talks	6

FY21 FTE Table

PhD Permanent	0.20
PhD Temporary	0
Tech. & Admin.	0.05
Grad. Student	0
Total	0.25

\$138k FY22 funding

\$29k carry over into FY21

\$122k FY21 total costs

\$40k carry over into FY22

Activity with Current Funding

- National Coordination
 - Coordinate Nuclear Data Efforts with USNDP/CSEWG
 - Attend USNDP/CSEWG meetings
 - Use R-matrix GNDS tools to translate, verify and improve proposed evaluations
 - R-matrix methods: validate use of Brune basis (now in SAMMY!)
 - CSEWG reviewer of LANL candidate evaluation $n+{}^6\text{Li}$ (not yet complete).
- International Coordination
 - One of organizers of “R-matrix Workshop on Methods and Applications”
 - Online in June 2021
 - Planning for Ohio in June 2023
 - On organizing committee for ND2022 in Sacramento, CA.
 - Continuing INDEN work of light-ion neutron models
 - Projects underway for new evaluations $n+{}^9\text{Be}$, $n+{}^{14}\text{N}$, $n+{}^{15}\text{N}$..
- Provide LLNL evaluations for ENDF
 - USNDP funds the translation over to ENDF
 - Support LLNL reports on TPC and actinide evaluations for CSEWG (Rob Hoffman, Gregory Potel).
- Developing and using GPU methods for R-matrix reconstructing and parameter fitting

R-matrix representation in GNDS

- Using and checking changes in GNDS 2.0.
 - eg. use `.ComputerCodes` module to store data normalizations for fast replication of data fits.
- Encouraging facility for future developments:
 - Brune parameters for R-matrix evaluations
 - Avoid bad physics of the $B=S(E)$ approximation
 - Distribute Brune parameters for indicating peak positions
 - Convert to Lane-Thomas for evaluations
 - Background amplitudes to replace different hard-sphere radius values

Improving ENDF/B-VIII.0: missing gamma and charged-particle distributions

- Many exit distributions missing in ENDF/B-VIII.0 for these
 - In GNDS become 'unspecified' distributions
 - Worse than 'isotropic' as some user codes crash
- Total of 7168 patches (above lists not exclusive)
 - Gamma channels missing – 6302
 - Light charged-particles missing – 1494 (H and He isotopes)
 - Recoil nuclei missing – 3361 (optional?)
- Candidate distributions available in TENDL2019
 - Using Fudge diff/patch to import all missing distributions
- Delayed by glitch in translating GNDS back to ENDF