USNDP LANL Report

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Los Alamos National Laboratory
Personnel Changes and National / International Activities

- **Staff Members and Post-Docs**
  - R.C. Haight retired, HyeYoung Lee succeeded
  - M. Jandel left LANL
  - M.R. Mumpower, a new post-doc hired by T-2 in Aug. 2015

- **Conference Organized and Plans**
  - Int. Workshop on Compound Nuclear Reaction (CNR15), Tokyo, Japan, Oct. 2015
    - 86 participants from 15 countries
    - LANL was in charge of proceedings editing
  - Workshop on Neutron Nuclear Data Directions into the Next Half Century, Santa Fe, Aug. 2016
  - Int. Workshop on Fission Experiments and Theoretical Advance (FIESTA 2017)

- **IAEA CPRs**
  - Cross section standards (G. Hale, D. Neudecker, T. Kawano)
  - Strength function and photo-nuclear data (T. Kawano)
  - Model code comparison under RIPL-4 CRP, to be started (T. Kawano)

- **FIRE (Fission In R-process Elements) topical collaboration**
  - Funded by DOE/SC and NNSA
  - LLNL (leading), LANL, BNL, University of Notre Dame, North Carolina State University
Photon Strength Function and DANCE Data

- DANCE detector at LANSCE suggested M1 scissors mode for actinides
  - Neutron capture cross section strongly enhanced

- Estimation of M1 photon strength from evaluated capture cross sections
  - Capture cross section calculations for more than 100 nuclei in the FP region performed
  - M1 strength and nuclear deformation studied
  - DANCE data can be reproduced without artificial STR re-scaling
LENZ Upgrade for Improvement of Reaction Modeling at LANL

LENZ
H.Y. Lee and A. Long

Cross Sections (n,p), (n, alpha)
Fe, Cr, Mo will be provided

Hauser-Feshbach model calculation

Microscopic Level Density Calculation can be tested against LENZ/DANCE

CoH, BeoH, CGMF
T. Kawano and M. Mumpower
P. Talou and I. Stetcu
USNDP Effort Impacts on Other Programs

- The LANL Statistical Hauser-Feshbach code CoH₃ and its subset CGM have been employed extensively to calculate nuclear reactions for other internal/external programs:
  - Isometric state production, and reaction on the produced isomers
  - Correlated emission of neutrons and gammas from fission
  - Study on cosmogenic origin of \(^{60}\)Fe

\[ \rho(E_1, E_2) \]

SMMC level density for reaction calculation (in collaboration with Y. Alhassid)

Fission cross sections on U236 isomers
DeCE: ENDF-6 Format Manipulation Code

- **Finally, we made it an open source!**
  - https://github.com/toshihikokawano/DeCE

- **C++ code to edit ENDF files interactively**
  - Extensively used to create ENDF files at LANL
  - DeCE is a by-product of reaction data evaluation
  - General ENDF Class provided

- **Examples:**
  - Convert ENDF files into human readable X-Y table format
  - Read another library or data and merge
  - Delete/add/subtract/re-scale each section
  - Automatic generation of index (dictionary)

```cpp
example(ifstream *fp, const int mt) {
  ENDF lib(M);
  ENDFReadMF3(fp,&lib,mt);
  ENDFWriteMF3(&lib);
}
```

```
read 3 51 "inelastic.dat"
make4
calc 3 = 2 + 4
calc 1 = 2 - 3
delete 3 3
quit
```