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# Covariance Processing at BNL

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# Processing Platform

## Linux Cluster (Upgraded in Aug '08)

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NNDC's First 64-bit Linux Cluster



### Hardware

- DELL PowerEdge Servers
- Total No. of Cores (CPUs): 75
- Total RAM: 152 GB
- Disk Storage: 3.8 TB

### Software

- OS: Red Hat Enterprise Linux
- Compilers: PGI Fortran 95  
GNU Fortran 95
- Cluster Management: ROCKS
- Queue Manager: PBS (a.k.a. Torque)
- Parallel Processing: MPICH2

# Processing with NJOY-99 and PUFF-IV

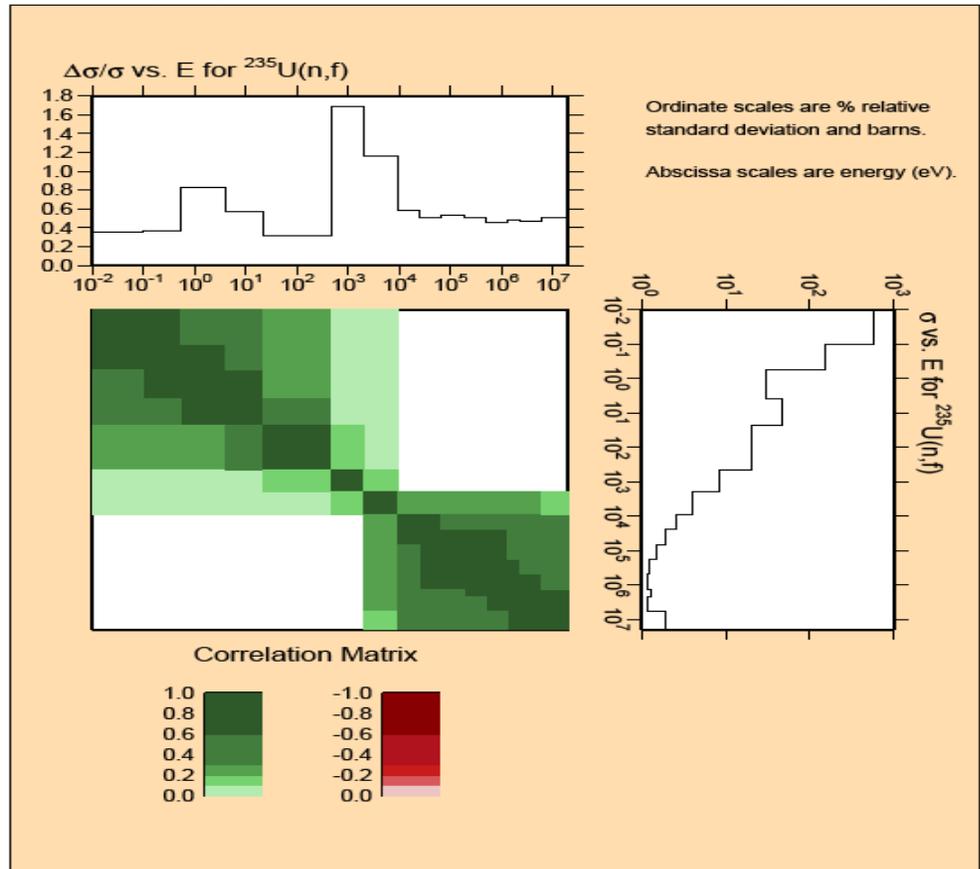
NNDC is one of few laboratories using both NJOY-99 and PUFF-IV

ENDF/A: Verified new  
LANL-ORNL evaluations  
for  $^{233,235,238}\text{U}$ ,  $^{239}\text{Pu}$ ,  $^{55}\text{Mn}$   
and  $^{19}\text{F}$

Covariance Evaluations for  
Criticality Safety: Verified  
new

- LANL-ORNL Full File 32  
for  $^{233,235,238}\text{U}$  and  $^{239}\text{Pu}$
- LANL-ORNL Converted  
File 32 for  $^{233,235,238}\text{U}$  and  
 $^{239}\text{Pu}$
- ORNL-BNL Low-Fidelity  
File 32 for  $^{55}\text{Mn}$  and  $^{90}\text{Zr}$

$^{235}\text{U}(n,f)$  Converted File 32, 15-group



Relative Uncertainty and Correlation Matrix Plots for  
 $^{235}\text{U}$  (ENDF/A) fission cross section

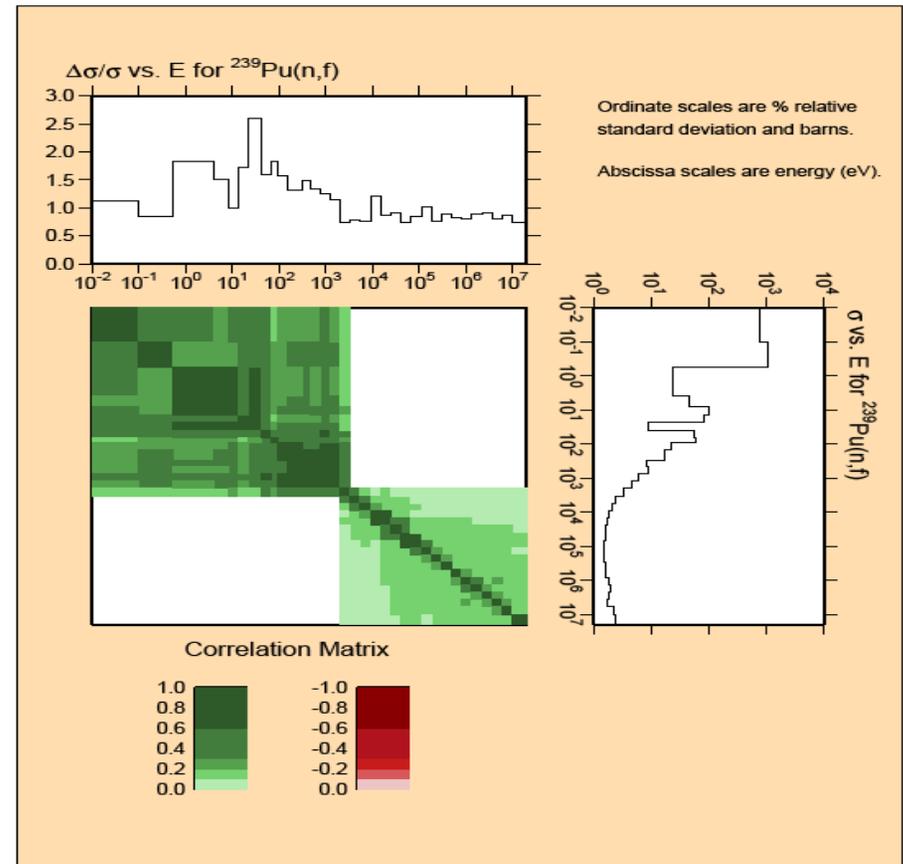
# Processing with NJOY-99 and PUFF-IV (continued)

GNEP initiative:

- *New Collapsing Algorithm Evaluation:* Generated 15-, 33-, 230-group covariances for  $^{56}\text{Fe}$ ,  $^{23}\text{Na}$ ,  $^{239}\text{Pu}$ ,  $^{235}\text{U}$  and  $^{238}\text{U}$  using JENDL-3.3

- *Nuclear Data Adjustment:* Generated 33-group covariances for the GNEP Covariance Library (108 materials from various sources), *more details in C. Mattoon's presentation*

$^{239}\text{Pu}(n,f)$  Converted File 32, 33-group



Relative Uncertainty and Correlation Matrix Plots for  $^{239}\text{Pu}$  (ENDF/A) fission cross section

# Conclusion

## What are the benefits for NNDC?

- Development of new skills in the use of the codes
- Application of new skills:
  - Verify processability of new ENDF/A evaluations, including new covariance evaluations in support of CSEWG and Criticality Safety.
  - Generate multigroup covariances for GNEP.

## New code capabilities needed

- NJOY: Process new LRF=7 resonance format (available in NJOY-2008)
- PUFF-IV: Generate NJOY-like plots