

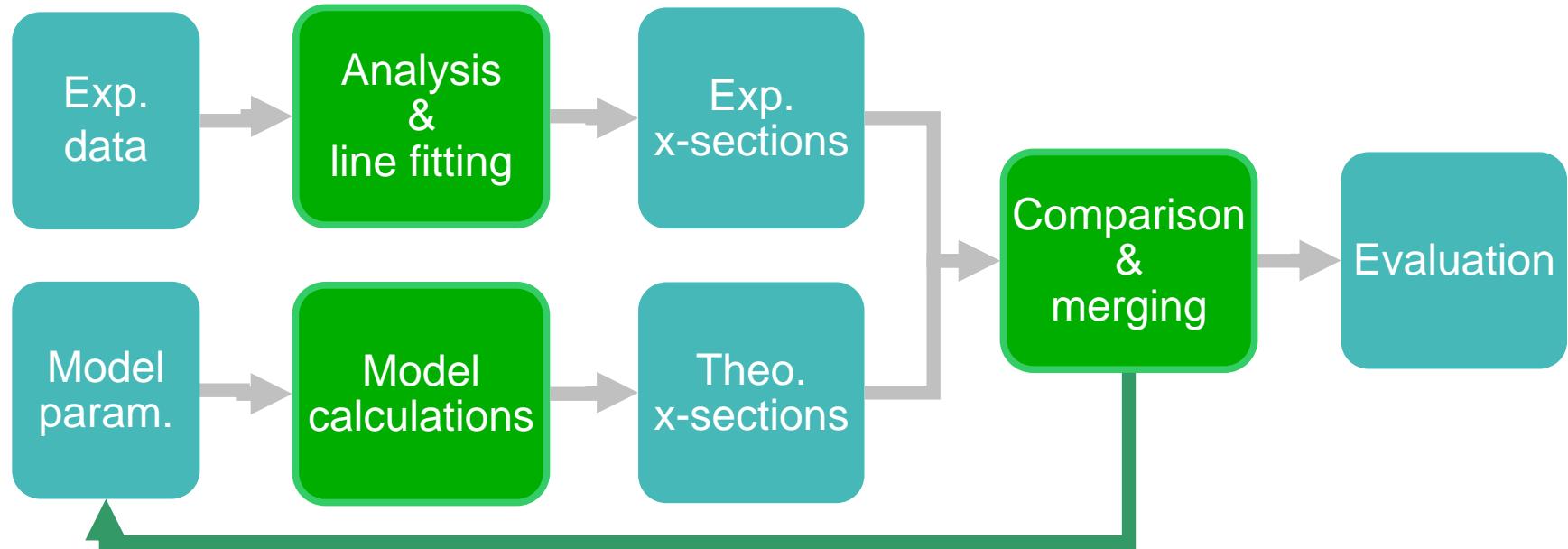


Computational needs: Global approach to Nuclear Data evaluation

*Mike Herman**
National Nuclear Data Center
Brookhaven National Laboratory

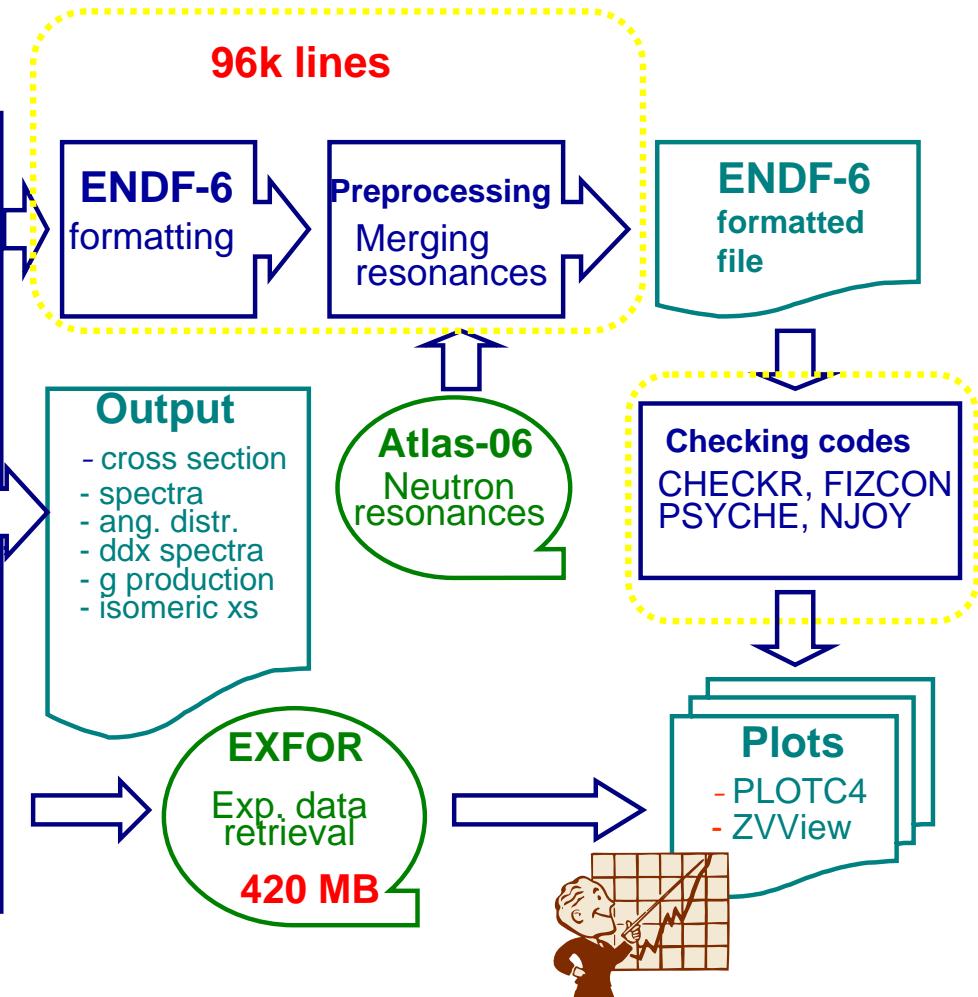
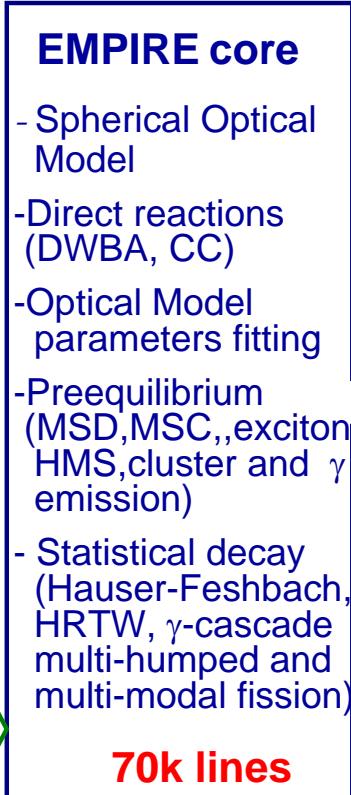
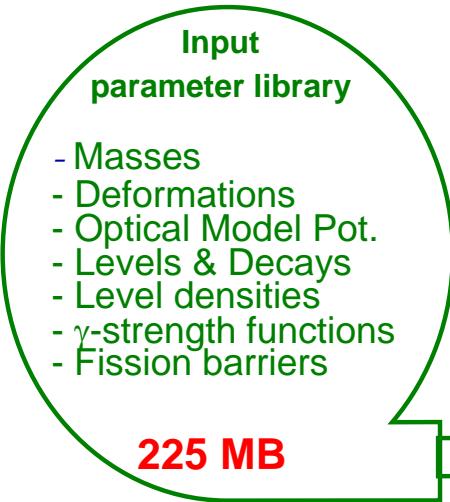
*Email: mwherman@bnl.gov

Traditional evaluation method



Nuclear reaction code EMPIRE

Graphic User Interface

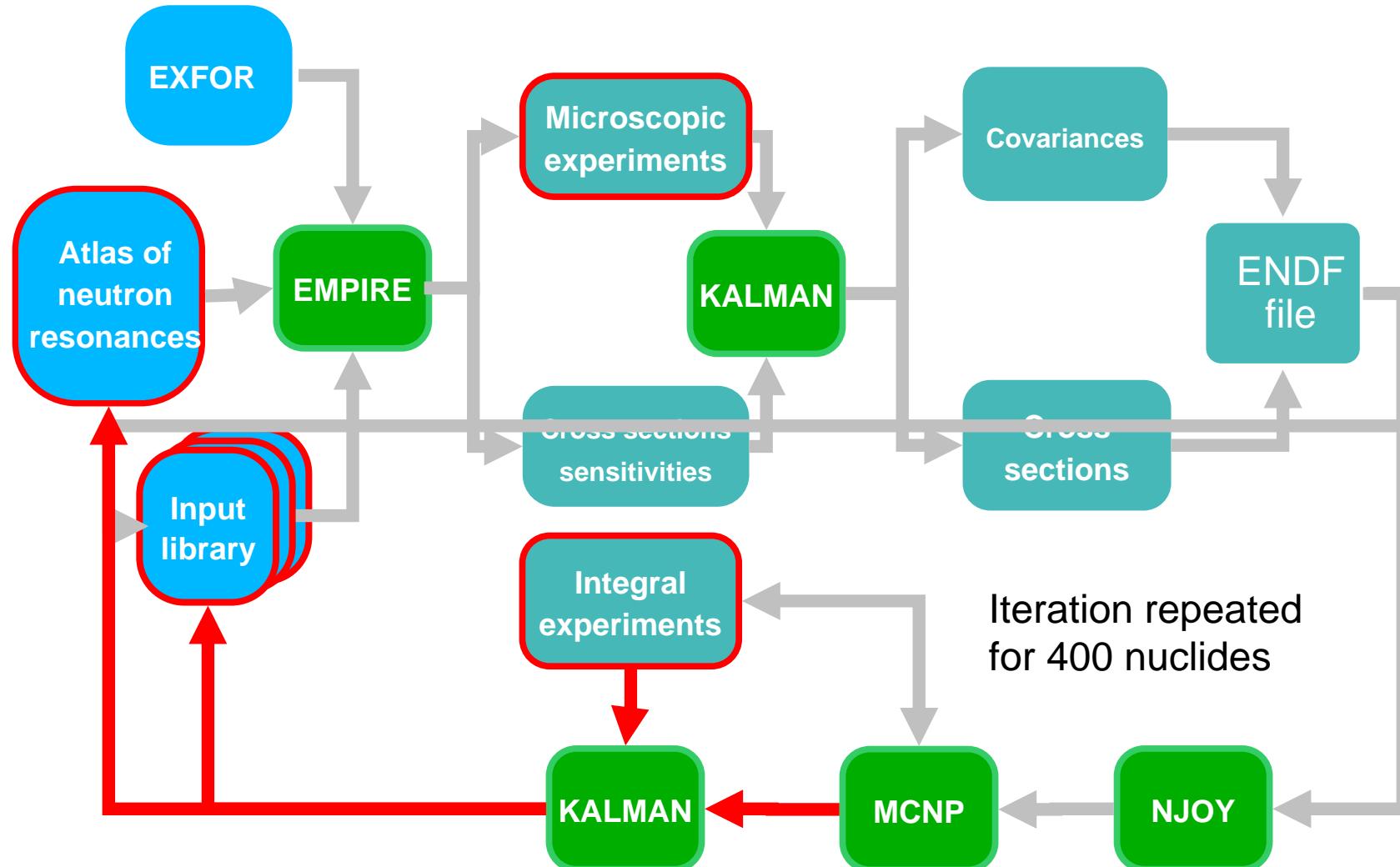


Global Nuclear Data Initiative

- ❑ Perform model calculations on ~400 nuclides
- ❑ Run benchmark calculations for ~700 integral experiments
- ❑ Produce microscopic & **integral** sensitivity matrices to model parameters
- ❑ Adjust model parameters to microscopic & **integral** measurements
- ❑ Iterate to produce consistent libraries of nuclear cross sections and of model parameters (both **with uncertainties/covariances**)



Global Nuclear Data Initiative



New aspects & advantages

- ❑ Use of cross sections for determination of model parameters
- ❑ Use of integral experiments for determination of parameters
- ❑ More consistent and reliable evaluations
- ❑ Improved set of model parameters

CPU time estimate

- Assumptions (for single 3GHz PC):
 - 400 nuclides
 - 50 parameters/nuclide
 - Single model calculation (1 nuclide up to 20 MeV)
 - 20 min
 - benchmark sensitivity to a single parameter 500 min
 - full library benchmark
400 000 min
- Single iteration (min):
 - Model calculations:
 $400 \times 50 \times 2 \times 20 = 800\,000$
 - Benchmark parameter-sensitivity:
 $400 \times 50 \times 2 \times 500 = 20\,000\,000$
 - Library benchmarking:
400 000
 - Total:
 $\sim 21\,000\,000 \text{ min} = 40 \text{ years}$
- **1 iteration per week - 2100 CPU's**