Overview of current activities for the IE / GRS / NRG Collaborative project

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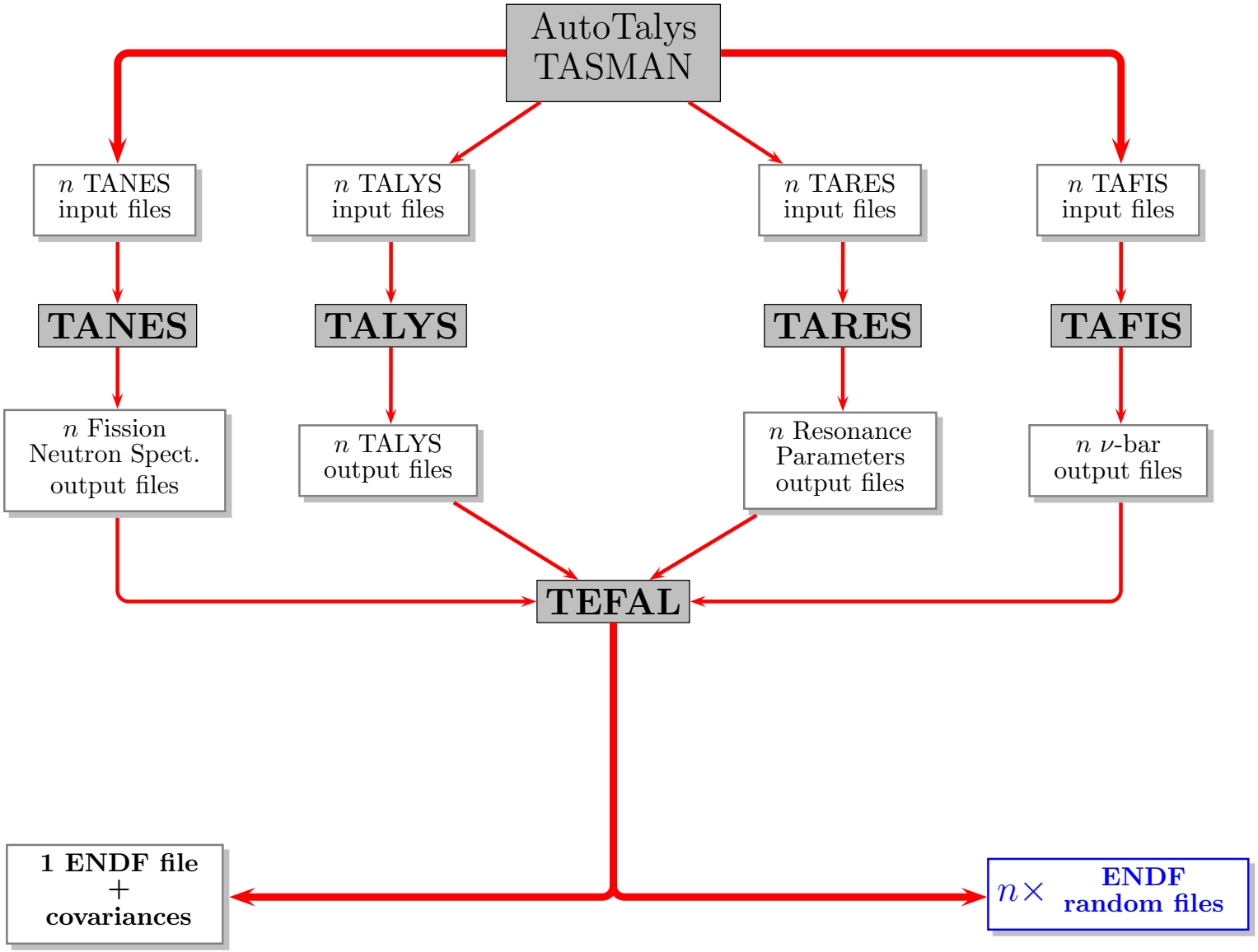
NRG field of expertise

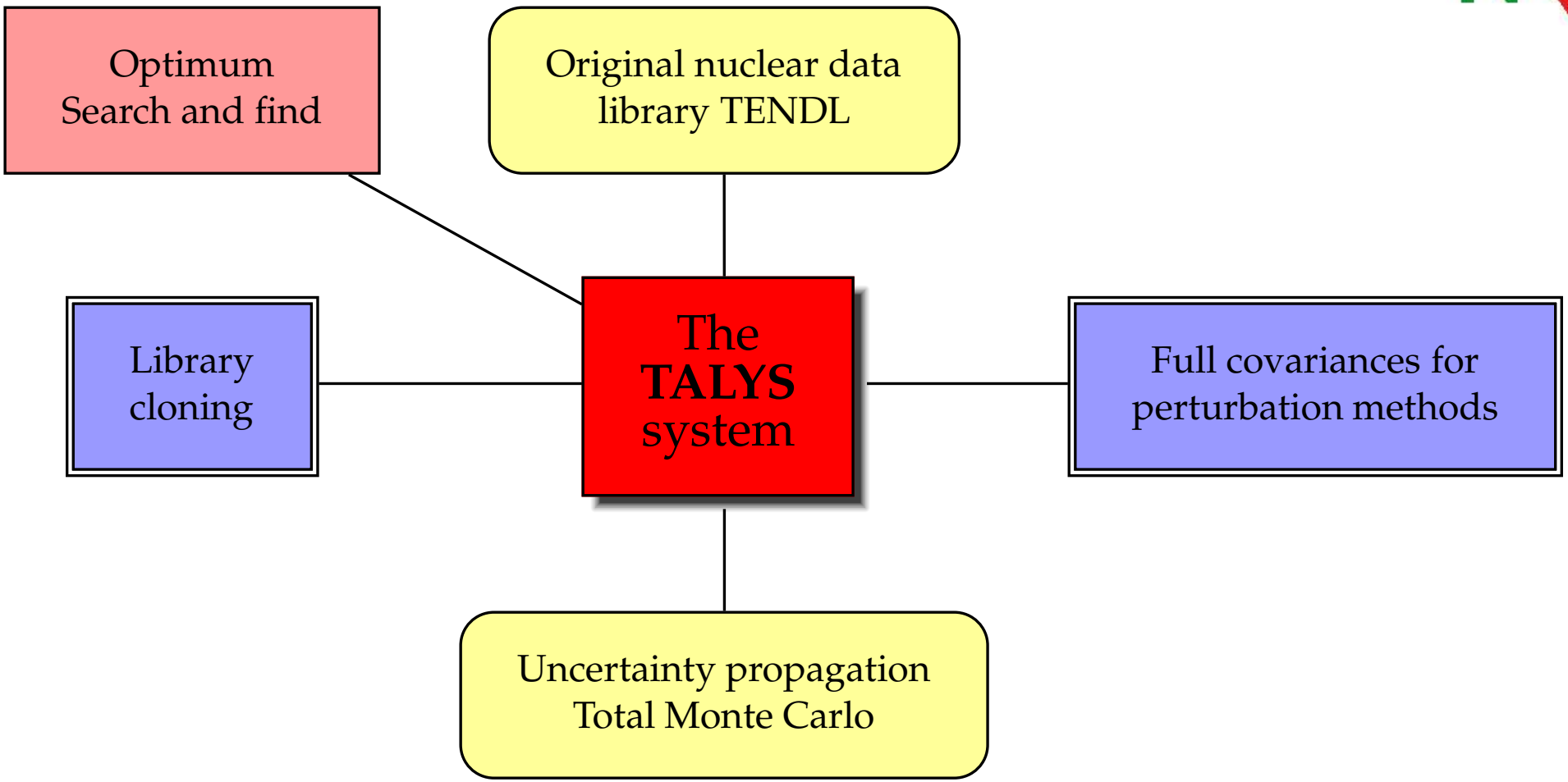
In this project we will at first focuss on nuclear data production.
For a given isotope, we can provide:

1. full evaluation in the ENDF format
2. covariance files from thermal to 20 MeV
3. ”*random*” files consistent with the covariance file
4. Processed files:
   - ACE files
   - Processed covariances in tabular form (different energy groups)
   - ”*covr, ampx*” format

Nuclear data file evaluation and production with the TALYS system.



Possible outcomes based on the TALYS system



Our preferred choice: ^{238}U

We recently have been working on precise evaluation of ^{238}U:

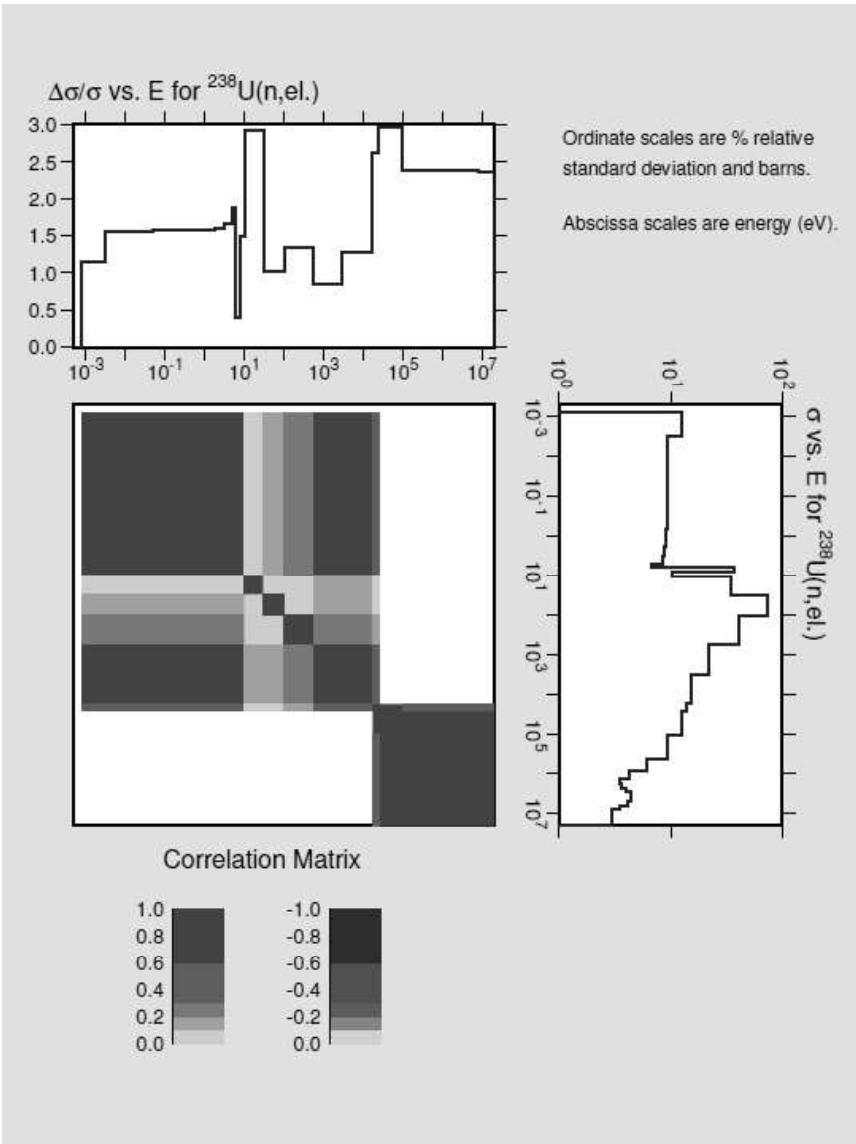
1. Cross sections, nubar, fission neutron spectrum: similar to ENDF/B-VII.0,
2. Unique set of covariances: MF31, 32, 33, 34 and 35,
3. Covariance files processed with NJOY (33, 44, 187 groups), PUFF (33 groups),
4. Partial benchmarking (criticality-safety, burn-up credit),
5. A few hundreds of random files will be ready soon.

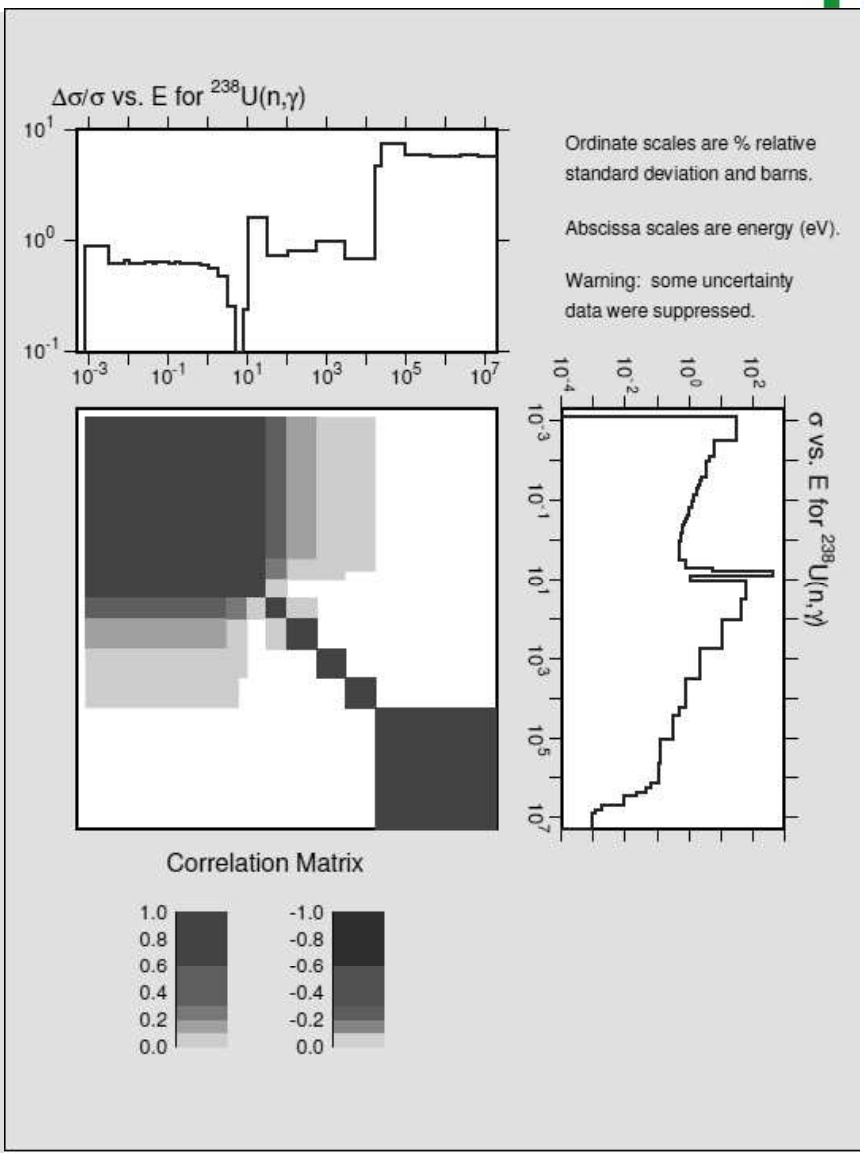
Examples of ^{238}U criticality-safety benchmarking

Table 1: Criticality-safety benchmarks calculated with MCNP, changing the ^{238}U evaluation. The other isotopes are kept equal to ENDF/B-VII.0.

Name	Benchmark	(pcm)	ENDF/B-VII.0	(pcm)	NRG	(pcm)	ENDF/B-VII.0 - NRG (pcm)	(pcm)
hmf1	1.00000	± 100	1.00009	± 40	1.00021	± 41	-12	± 57
hmf28	1.00000	± 300	1.00243	± 42	1.00364	± 38	-121	± 57
ici1-1	0.96900	± 500	0.98148	± 31	0.98180	± 32	-32	± 44
lct1-1	1.00000	± 310	1.00015	± 73	0.99858	± 71	157	± 102
lct1-2	0.99980	± 300	1.00039	± 76	0.99978	± 71	60	± 104
lct1-3	0.99980	± 300	0.99774	± 75	0.99764	± 66	10	± 100
Average absolute deviation between NRG and ENDF/B-VII.0 for 120 benchmarks: 108 ± 101								

Covariance examples





Conclusions

1. We have a large experience in nuclear data and ENDF file production (contributions to different libraries: JEFF, ENDF/B-VII.0, FENDL, TENDL...).
2. The ^{238}U isotope would be our preferred choice for this project, but other isotopes can be added later.