

# Overestimated uncertainties with ENDF/B-VIII.0

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# ENDF/B-VIII.0 release

- In 2018, the ENDF/B-VIII.0 library was released
- The library contains many updates in relevant cross section and uncertainty data
- The library is supposed to be a general-purpose library, but:

## Mean values

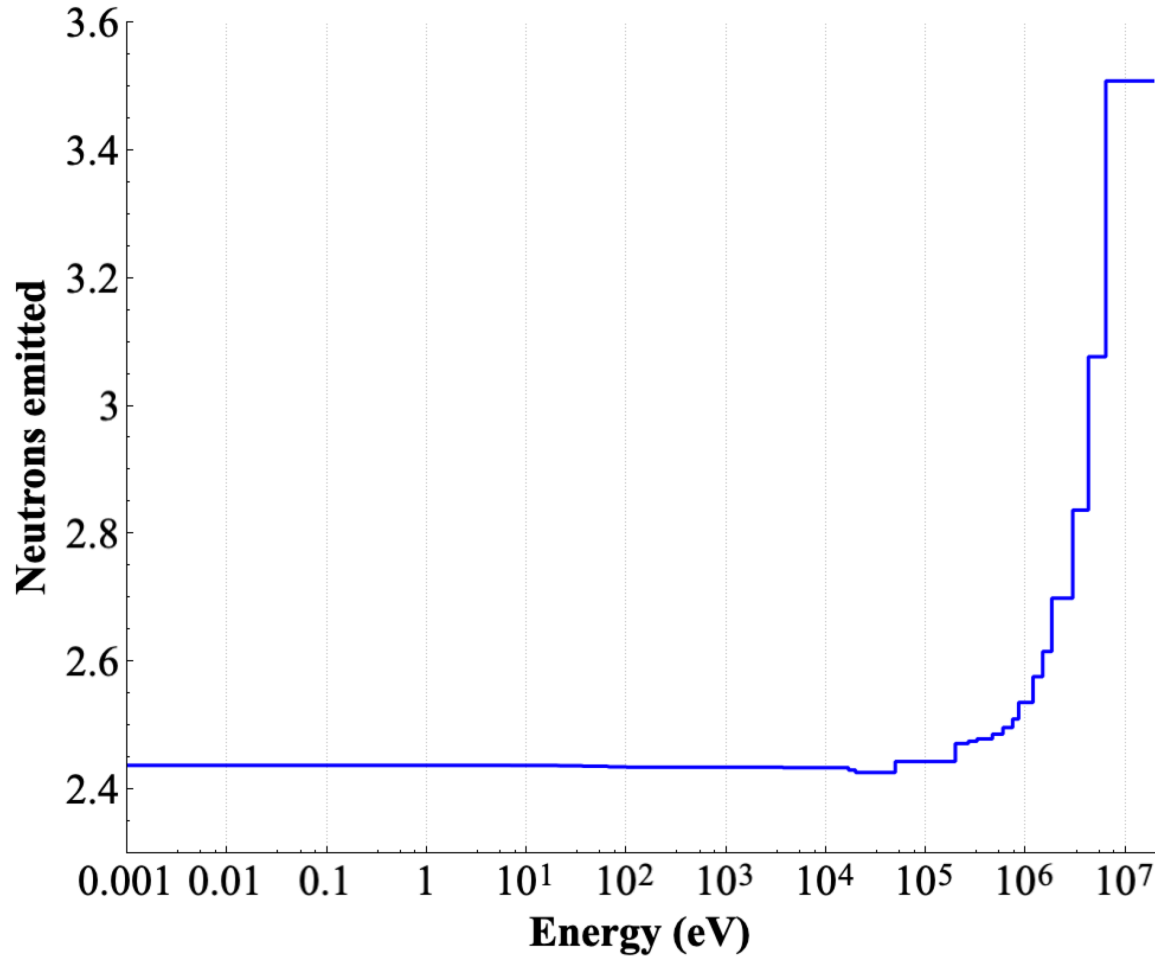
- Nuclear data mean values are adjusted during the evaluation process with respect to ICSBEP\* benchmark experiments
- The mean values allow for an accurate prediction of the multiplication factor

## Uncertainties

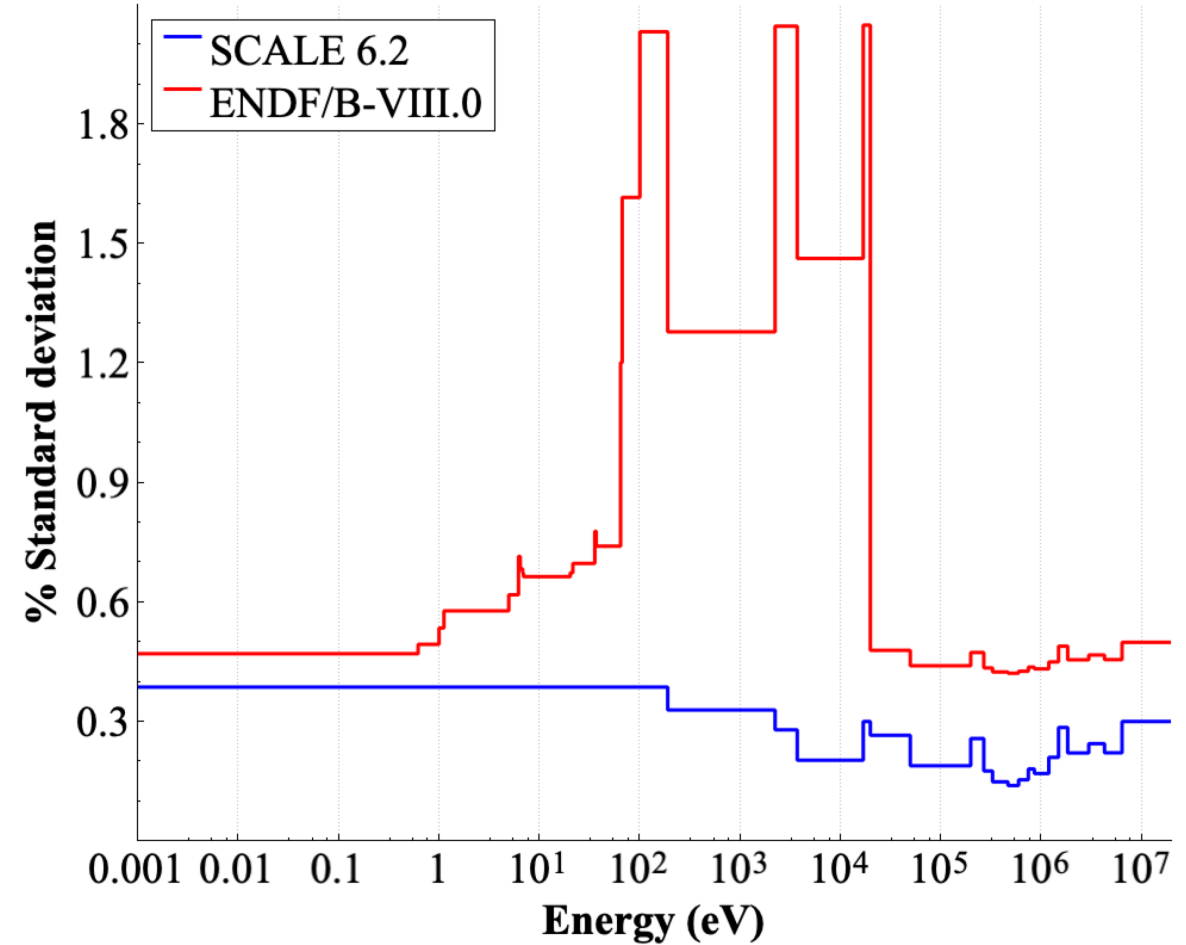
- The covariance data does not reflect the adjustment to ICSBEP\* experiments
- Uncertainties for integral quantities such as k-eff are usually overestimated

# Significant changes of important uncertainties

**U-235 nubar**



**U-235 nubar uncertainty**



# Overestimation of uncertainty for criticality experiments

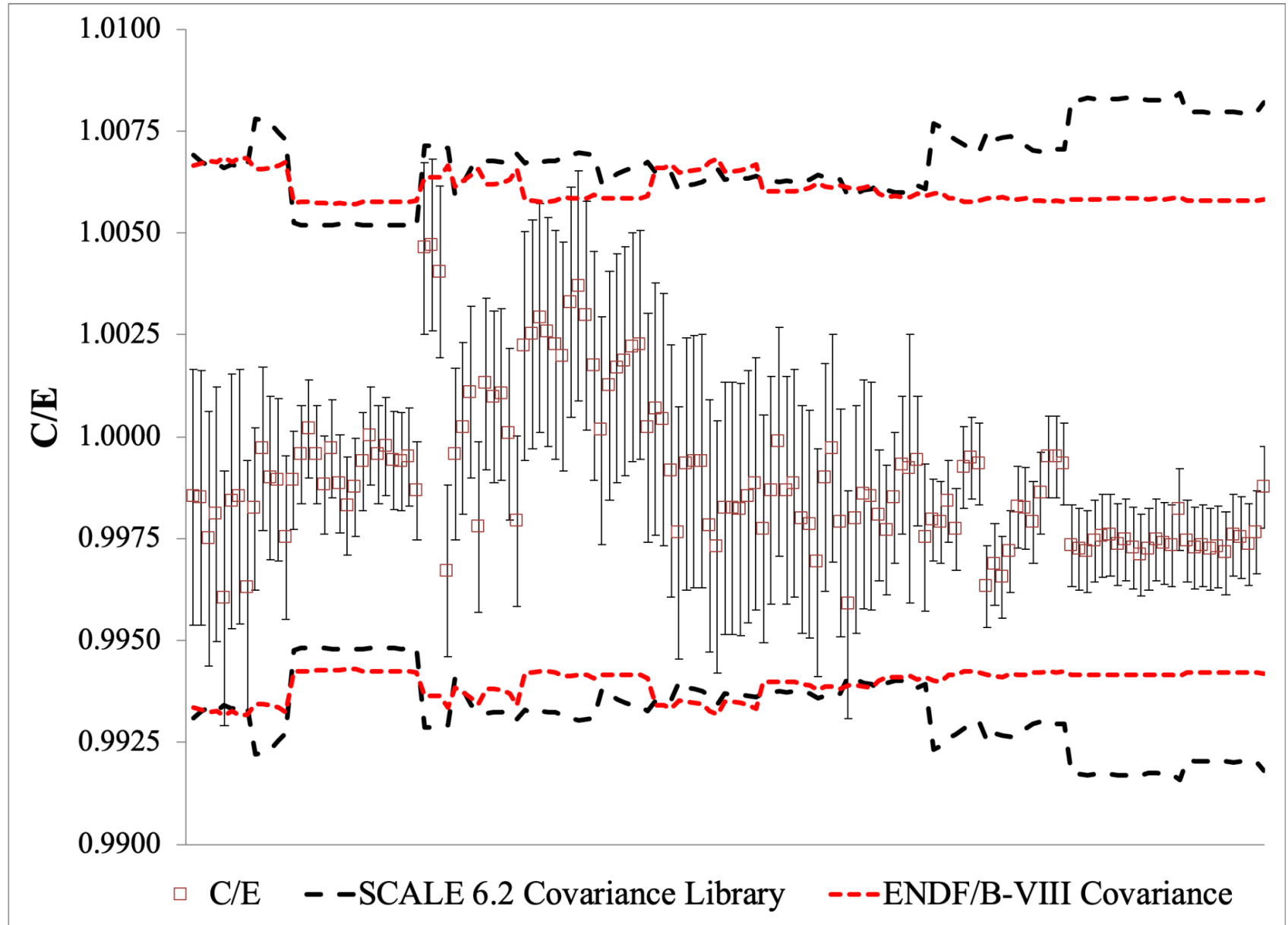
LEU-COMP-THERM:

- Low enriched uranium
- Thermal spectrum
- Compound

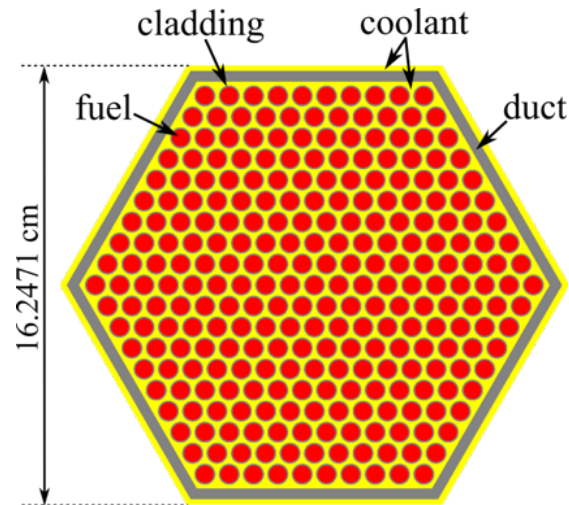
All C/E results lie within nuclear data uncertainty band

A  $1\sigma$  uncertainty band should by definition only include 68.3% of the values

→ The impact of nuclear data uncertainties with respect to ICSBEP integral experiments seems overestimated due to tuning of mean values without adjusting covariances.

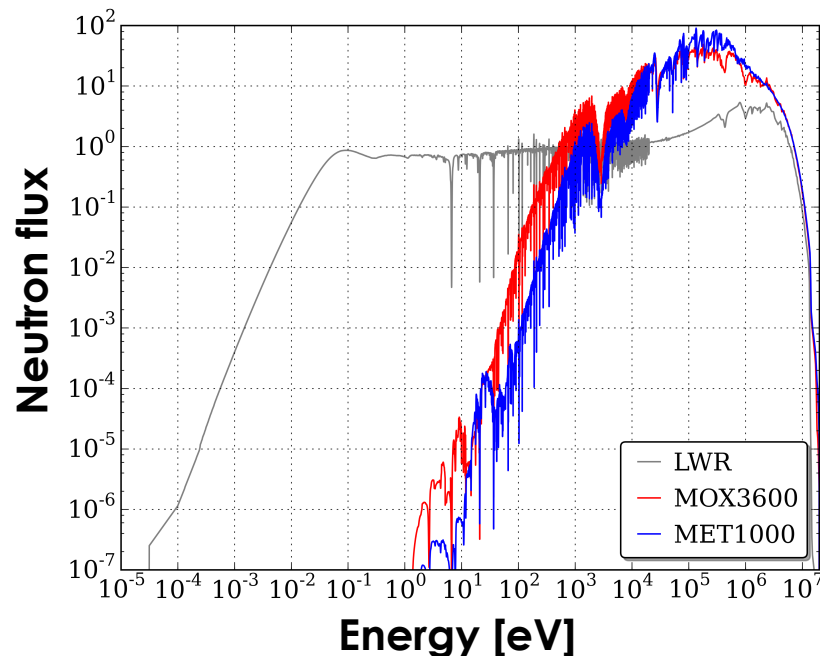


# Large uncertainties for advanced reactor concepts



## Sodium-cooled fast reactor assembly

	Nominal value	Uncertainty
Eigenvalue	1.28167	1.07%
Doppler constant	-300 pcm	5.44%
Na-void worth	6,016 pcm	5.23%



- Large uncertainties for safety-relevant integral quantities for SFRs and other concepts
- Increased relevance for advanced reactors with different materials, geometries, neutron spectra etc.

# Need for covariance data adjustment

- Uncertainties in integral quantities related to ICSBEP are seemingly overestimated due to tuning of mean values without adjusting covariances.
- This can have an impact on licensing in case of overly large uncertainties of safety-related parameters
- We need adjusted covariance data to better represent uncertainty in integral quantities
- Unadjusted data is still necessary as basis for evaluators and as basis for adjustment
- New GNDS format will be able to store both types