

LANL FPY Covariances

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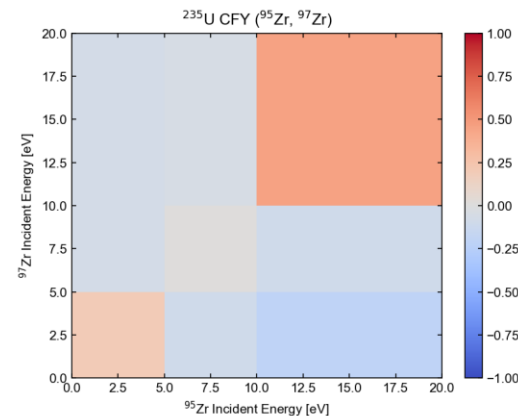
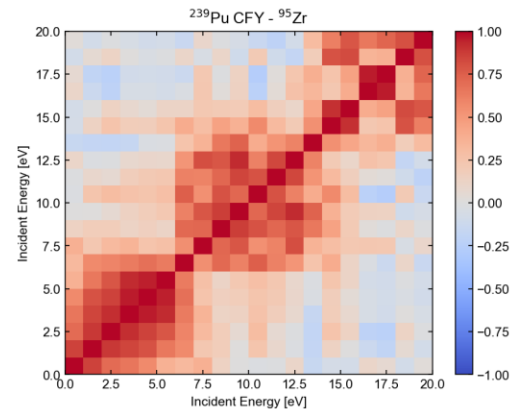
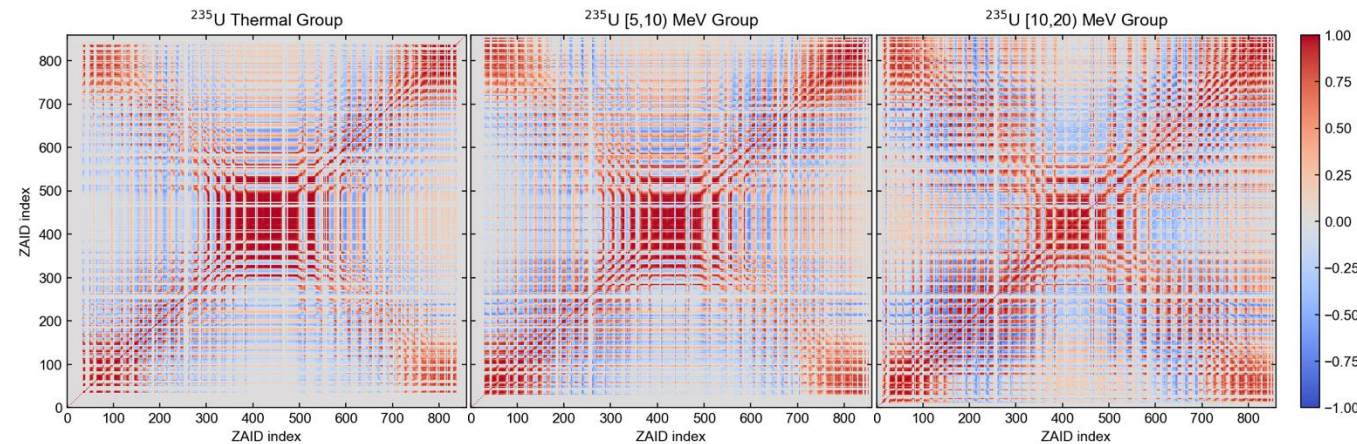
Outline

- Energy-dependent Fission Product Yield Covariances
- Impact on R-value Calculations
- Impact on Decay Heat Calculations



Energy-dependent Fission Product Yield Covariances

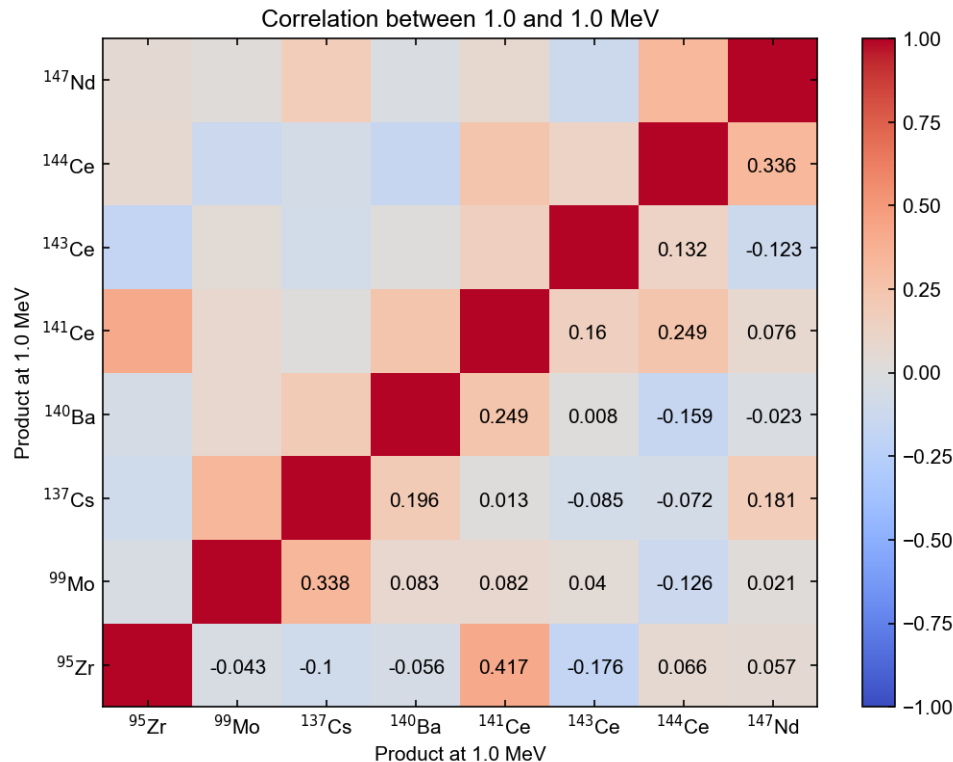
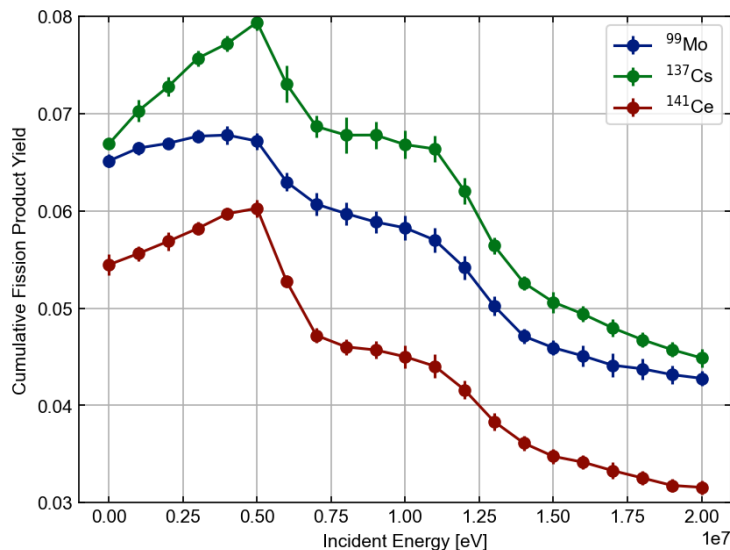
- The evaluation is performed on a 21-energy grid
- The covariance is grouped into ~3 groups for the file
- There are cross-nuclide and cross-energy correlations



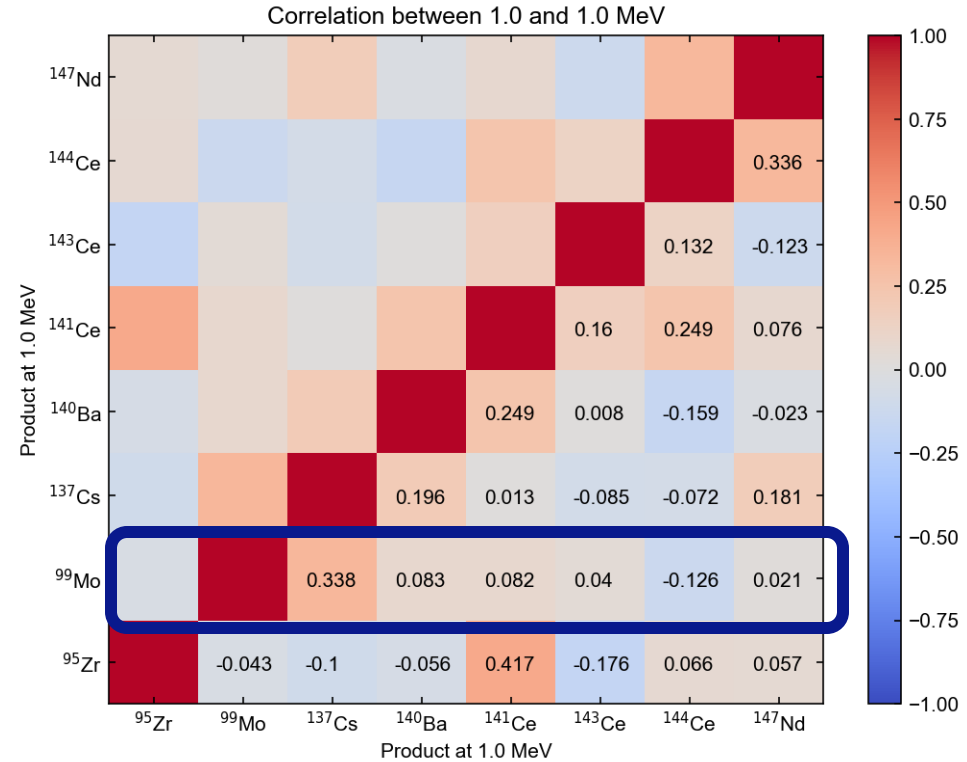
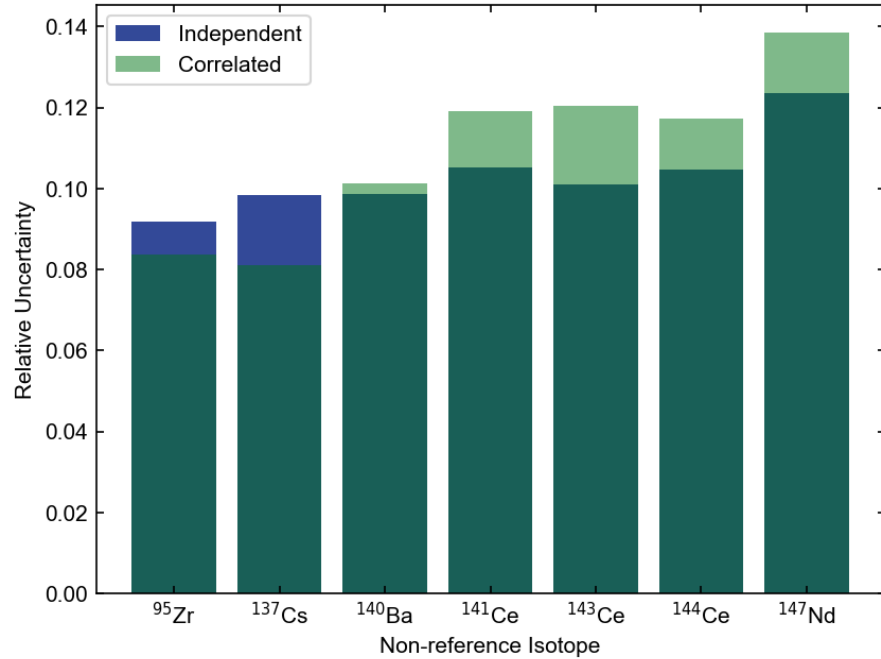
R-value Calculations

New LANL Energy-Dependent Covariances in Flattop-Oy R-value Calculations

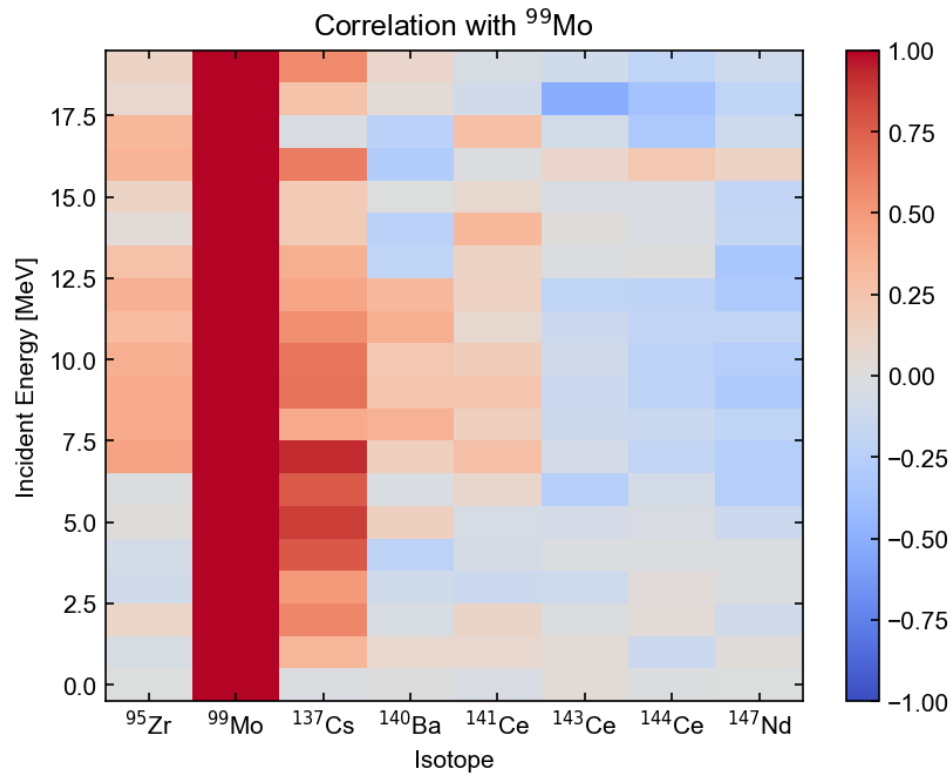
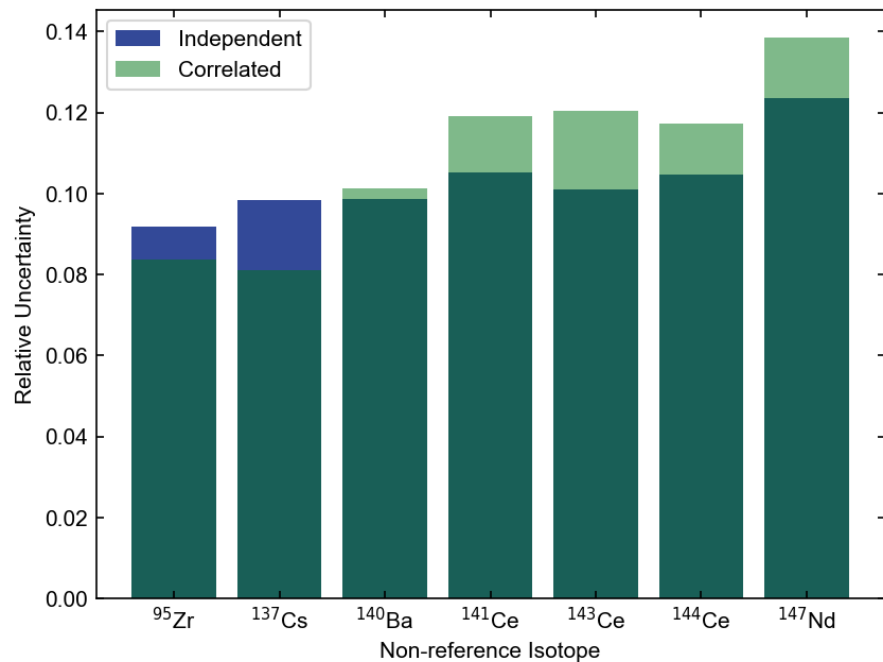
$$R_i = \frac{Y_i(\text{Pu})/Y_{99}(\text{Pu})}{Y_i(\text{U}_{th})/Y_{99}(\text{U}_{th})}$$



Impact of Correlations on the R-value Uncertainties



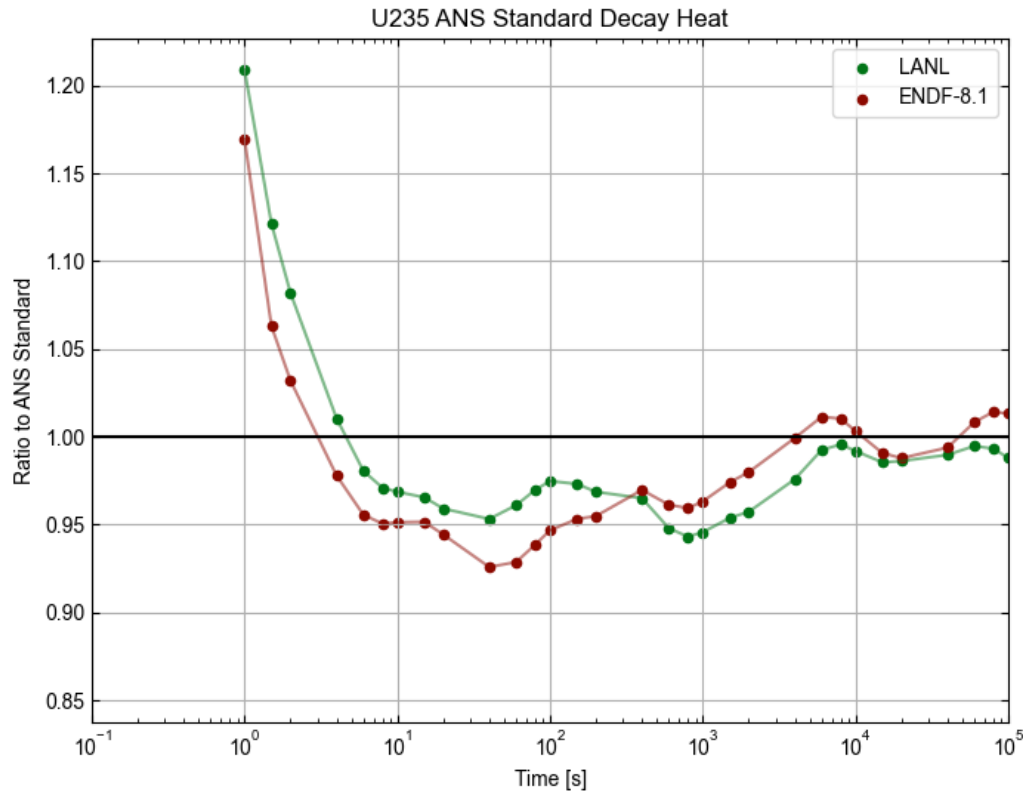
Impact of Correlations on the R-value Uncertainties



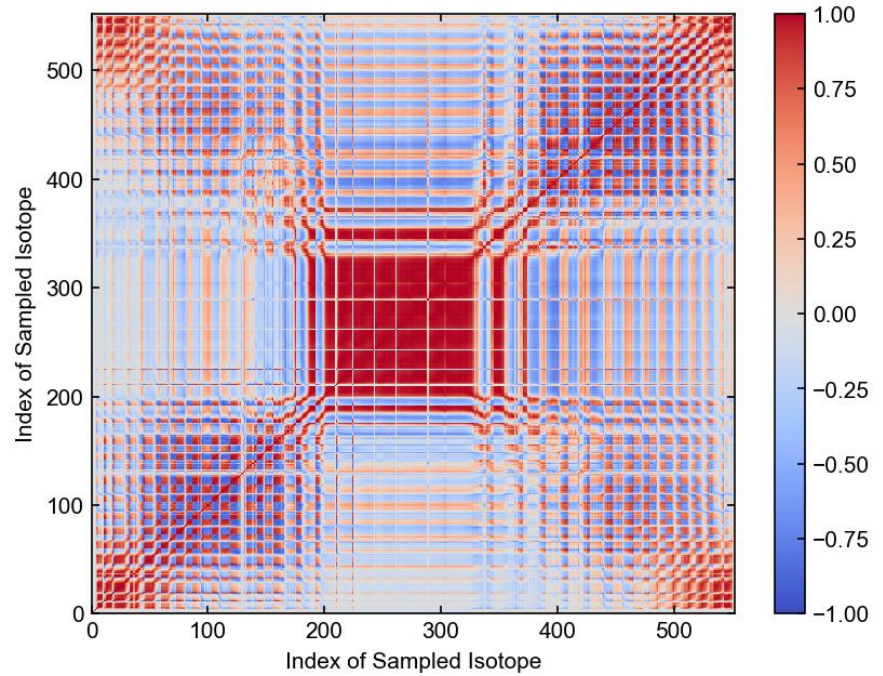
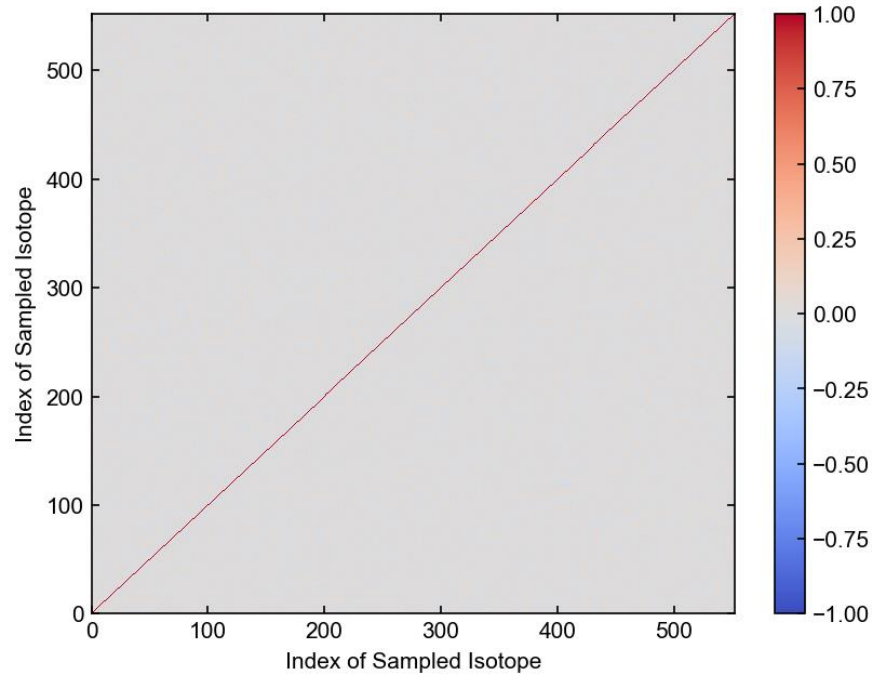
Decay Heat Calculations

New LANL ^{235}U Yields in ANS Decay Heat Standard

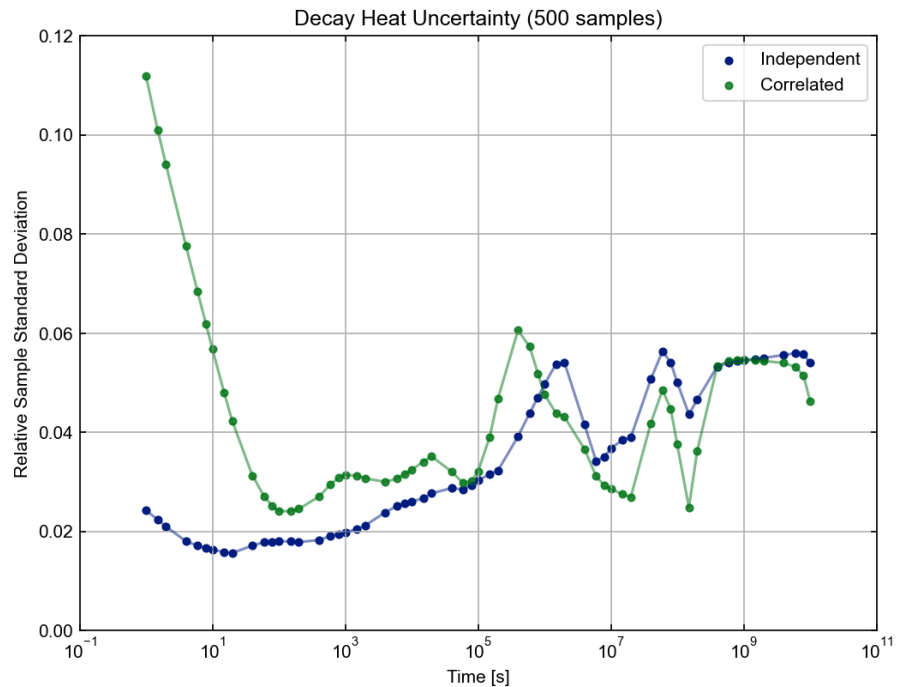
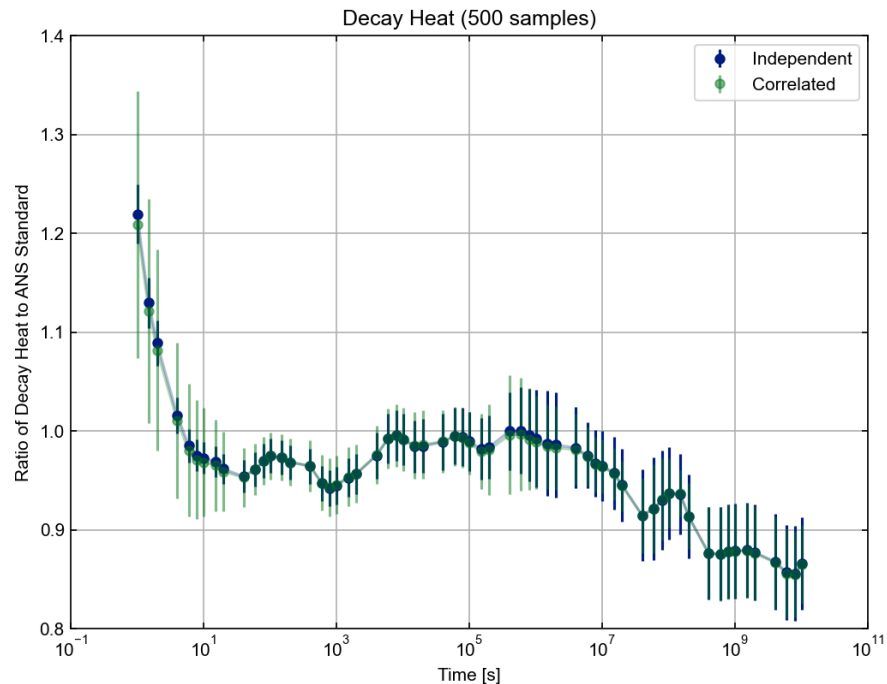
- Decay heat calculated with CINDER for the ANS Decay Heat Standard^[1]
- The decay data was updated to the ENDF/B-VIII.1 decay sub-library
 - LANL CINDER API (C. Josey)
- Compared to ENDF-B/VIII.1 FPY and decay data.



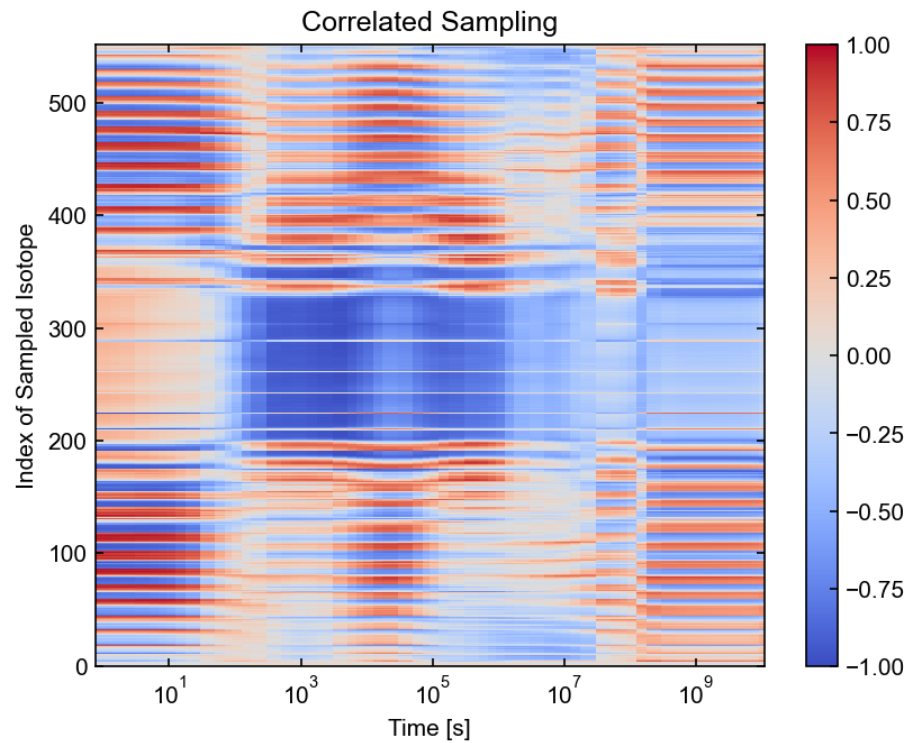
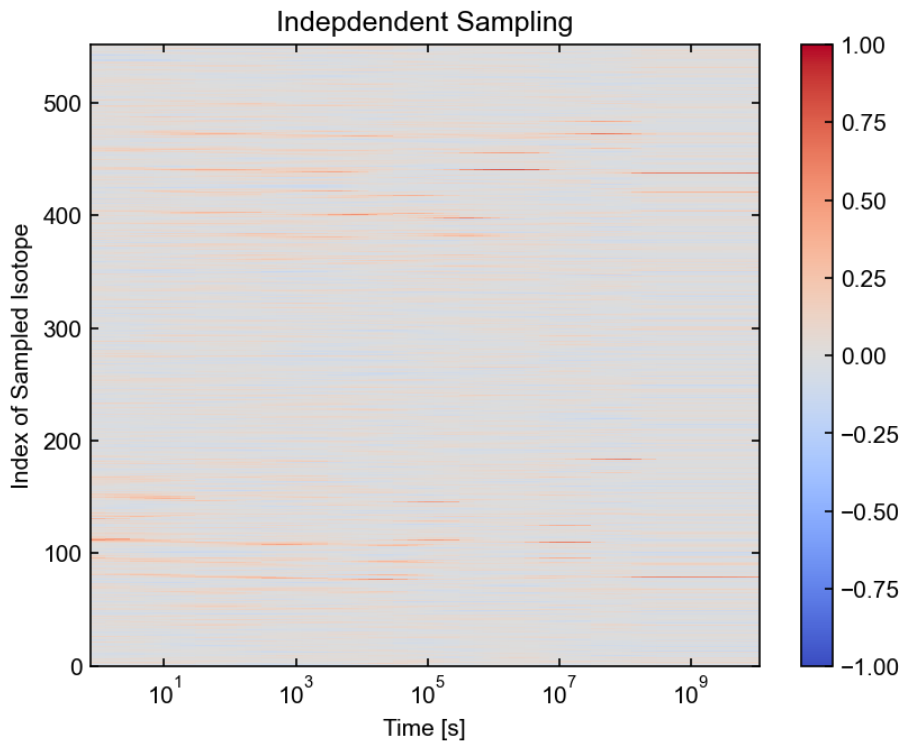
IFY Correlations in Decay Heat Calculations



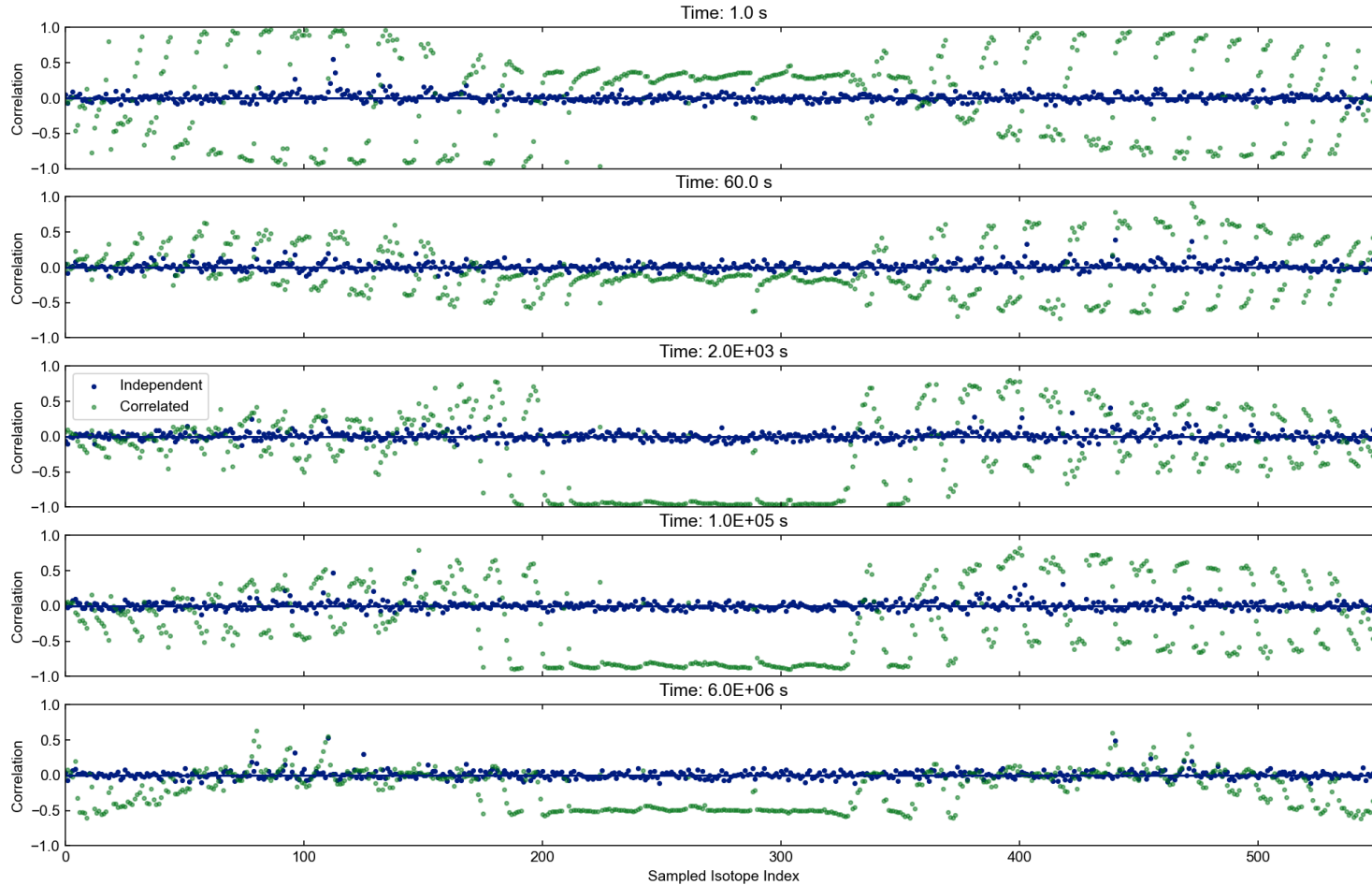
Impact on Decay Heat Calculations



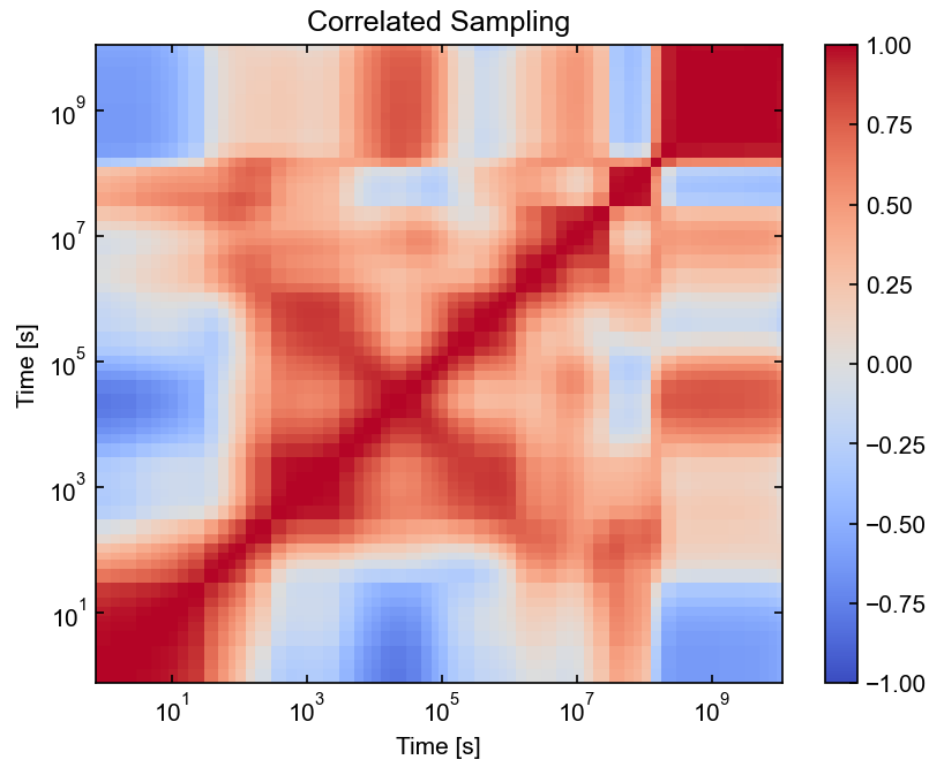
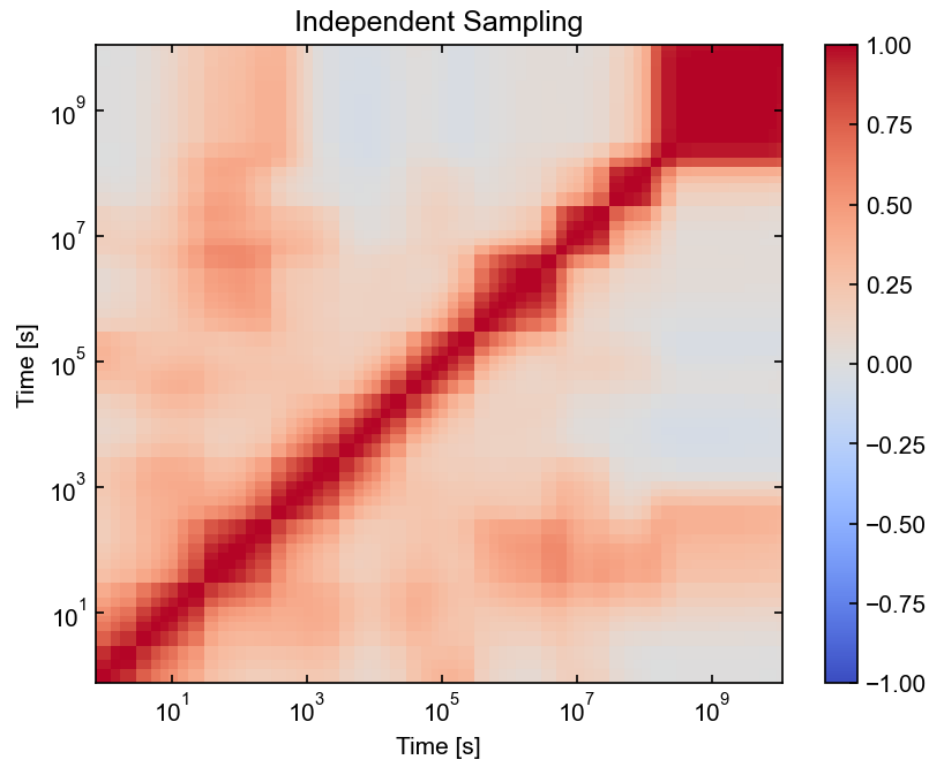
Correlations Between Isotopes and Decay Heat



Correlations Between Sampled Isotopes and Decay Heat



Correlations Between Decay Heat at Different Times



Conclusions

- The new LANL energy-dependent fission product yield evaluation will include energy-dependent covariances
 - Cross-energy and cross-nuclide terms are included
- For the test evaluated files, the correlations are grouped into 3 groups
 - Some structure is lost in this grouping
- The correlations have significant impact on R-value and decay heat calculations with the test files
 - On the calculated uncertainties
 - On the calculated means if sampling is performed

