Task 3.2: Contribution to the definition of a common strategy for the ND based on integral experiments analysis

- CIEMAT study is focused on a Monte Carlo strategy
- Identify a group of integral experiments covering similar energy range and isotopes
- Select main contributors (isotope x reactions x energy groups) to the experimentally measured parameters
- Generation of random cross section (NRG method) with the following constraints:
  - Following existing covariance matrices
  - Set of cross sections sufficiently comprehensive for the problem
  - Focus sampling on the energy groups of interest for the problem
- MCNP to obtain calculated parameters using a combination of the cross sections
- Results analyzed using maximum likelihood theory → Trends, possible uncertainty reduction

Task 3.3.5: Contribution to criticality benchmarks

- Following the Monte Carlo strategy proposed, a set of 6 criticality benchmarks with lead reflector were chosen
- 1000 ^{208}Pb random libraries were generated by NRG
- Search for critical parameters has become biased by sampling variations of only one isotope (^{208}Pb)
- Random cross sections of other important isotopes (^{235}U, ^{238}U, ^{239}Pu,…) are required to complete the optimization/feedback on evaluated cross sections from the benchmark
- Nevertheless, it has allowed us to test the methodology:
  - Identifying the main energy groups of the ^{208}Pb cross section
  - Reduce the uncertainty of a fictitious ^{208}Pb covariance matrix

Task 3.3.4: Contribution to GUINEVERE

- Simulations done for the experimental critical core measurements:
  - Criticality constant using JEFF3.1.1, ENDFB7r0 and JENDL4.0 Calculated keff = 1.013 → +1300 pcm! (for all the 3 libraries)
  - ^{235}U, ^{238}U, ^{237}Np and ^{239}Pu axial traverses
  - Spectral indices
- k_{eff} sensitivity analysis to ^{235}U enrichment, fuel density, lead density and iron density: conclusions under evaluation.
- On going simulation of the approach to criticality (starting in k_{eff}~0.88) using different enrichments and lead densities for the critical loadings.

Task 3.3.3 & 3.3.1: Contribution to PROFIL benchmark and MUSE critical core characterization

- First results obtained for PROFIL benchmark using JEFF3.1.1 and ENDFB7r0 will be sent to WP3 leader next week
- CIEMAT EVOLCODE burn-up system (MCNP+ORIGEN) has been used using two approaches:
  - One step irradiation
  - Ten steps irradiation considering the actual cycle description
- Simulation of MUSE-4 critical core has been performed using JEFF3.1.1 and ENDFB7r0 libraries
- In order to identify main sources of uncertainties, random cross sections of ^{235}U, ^{238}U, ^{239}Pu and ^{23}Na will be required