Benchmark revision proposal, to be agreed by the EGAMCT group
R2: infinite 3D assembly

- 18 axial zones
- 4,752 fuel volumes

Output:
- $K_{\text{eff}}$
- Fluxes in fuel volumes of rods 1 and 2, for each of the 18 axial slices (36 tallies)
- Radially averaged fluxes (over all fuel volumes of one axial slice) in each of the 18 axial slices (18 tallies)
- The two last outputs can be calculated using ¼ symmetry to reduce statistical uncertainties
- All tallies are calculated over the whole energy range (from 0 to 20 MeV) and are mean tallies (ie averaged over all active cycles). They are provided with their associated error bars (ie 1-sigma std deviations estimated with independant simulations)
- Fluxes measured in cm$^{-2}$ per source neutron if possible
S2 : infinite 3D assembly

- 18 axial zones
- 4752 fuel volumes

**Output:**
- \( K_{\text{eff}} \)
- Fluxes in fuel volumes of rods 1 and 2, for each of the 18 axial slices (36 tallies)
- Radially averaged fluxes (over all fuel volumes of one axial slice) in each of the 18 axial slices (18 tallies)
- The two last outputs can be calculated using ½ symmetry to reduce statistical uncertainties
- All tallies are calculated over the whole energy range (from 0 to 20 MeV) and are mean tallies (ie averaged over all active cycles). They are provided with their associated error bars (ie 1-sigma std deviations estimated with independant simulations)
- Fluxes measured in cm\(^{-2}\) per source neutron if possible
Distributions of statistical errors per elementary volume for the 3 PWR models and the 3 GBC-32 transport cask models for 1 simulation with $10^8$ neutrons ($10^5$ n/generations and $10^3$ generations) (symmetries are not used)
GBC-32 models

S1 : Cells error distribution

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<tr>
<th>Entries</th>
<th>8448</th>
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<tbody>
<tr>
<td>Mean</td>
<td>0.6581</td>
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<tr>
<td>RMS</td>
<td>0.1974</td>
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S2 : Cells error distribution

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<td>RMS</td>
<td>18.39</td>
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S3 : Cells error distribution

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<tr>
<td>RMS</td>
<td>41.75</td>
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26% of elementary fuel volumes
Evolution of statistical uncertainty (1σ) of the standard deviation of a group in function of the number of independant simulations used.
Lessons taught by 2015 analysis

- GB-32 transport cask and PWR benchmarks are each typical of criticality safety assessment concerns and reactor physics concerns
- R2 and S2 have different qualitative behavior
- Their biases are larger than in S1 and R1
- Amongst the different PWR models, R2 is the most challenging
- Amongst the different S models, S2 is the most challenging
- Fission rates add not much compared to fluxes
- No new methods were proposed to study EALF

A detailed study of R2 and S2 keff and fluxes could be a solid basis to draw conclusions and would make the comparison easier