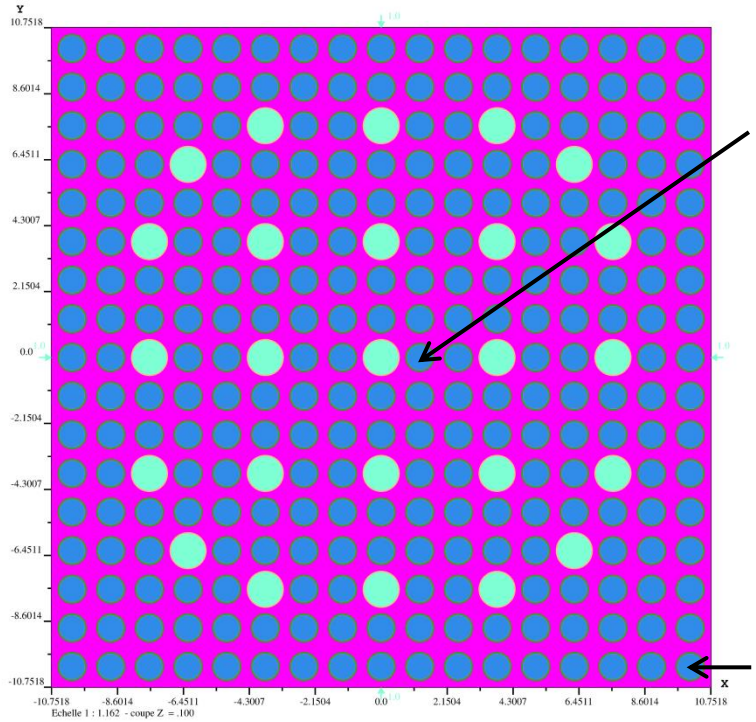
Benchmark revision proposal,
to be agreed by the EGAMCT group

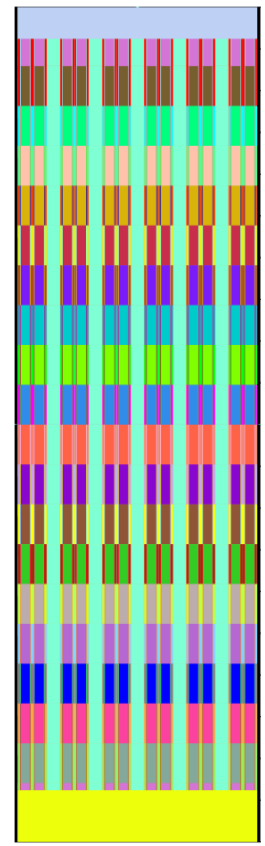
R2 : infinite 3D assembly

- 18 axial zones
- **4 752 fuel volumes**



Rod 1 : (1;0)

Rod 2 : (8;8)



top

AZ – 18
AZ – 17
AZ – 16
AZ – 15
AZ – 14
AZ – 13
AZ – 12
AZ – 11
AZ – 10
AZ – 9
AZ – 8
AZ – 7
AZ – 6
AZ – 5
AZ – 4
AZ – 3
AZ – 2
AZ – 1

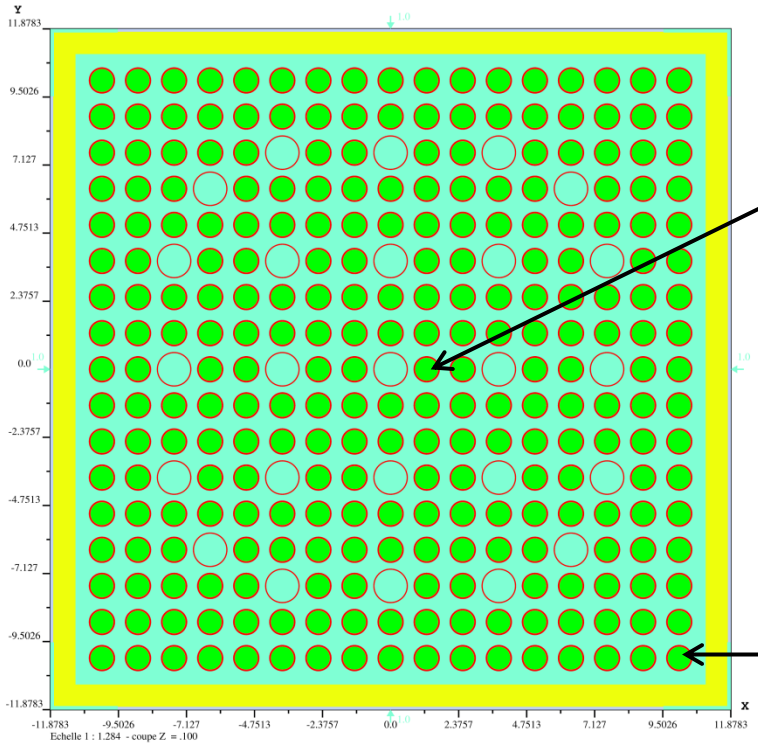
bottom

<u>Output</u>:

- Keff
- 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

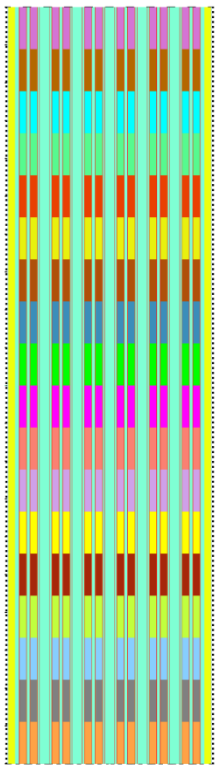
S2 : infinite 3D assembly

- 18 axial zones
- **4 752 fuel volumes**



Rod 1 : (1;0)

Rod 2 : (8;8)



top

AZ – 18
AZ – 17
AZ – 16
AZ – 15
AZ – 14
AZ – 13
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AZ – 8
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bottom

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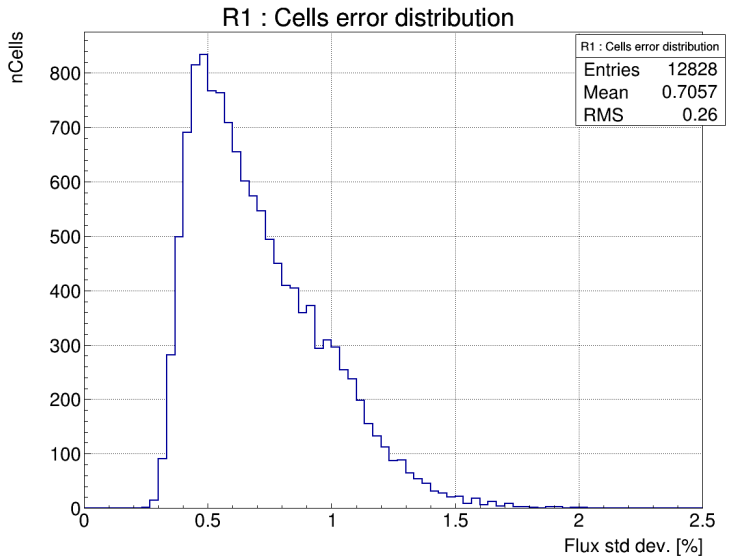
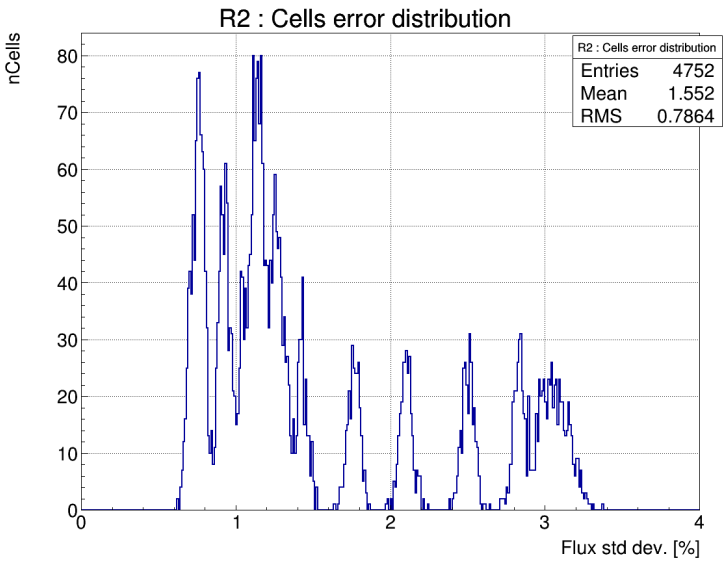
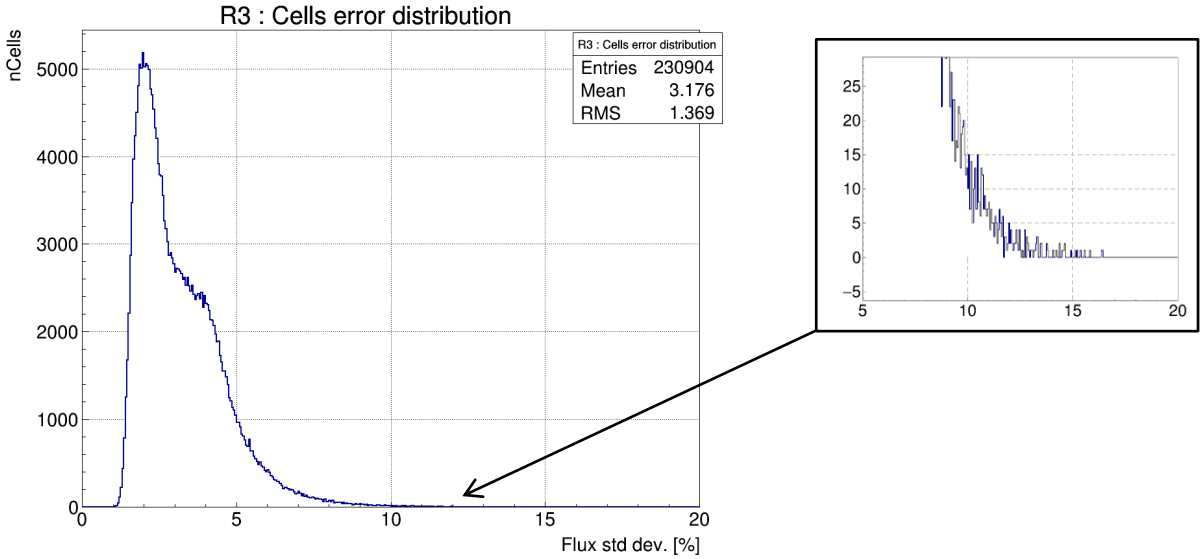
Distributions of statistical errors per elementary volume for the 3 PWR models and the 3 GBC-32 transport cask models for
1 simulation with 10^8 neutrons (10^5 n/generations and 10^3 generations)
(symmetries are not used)

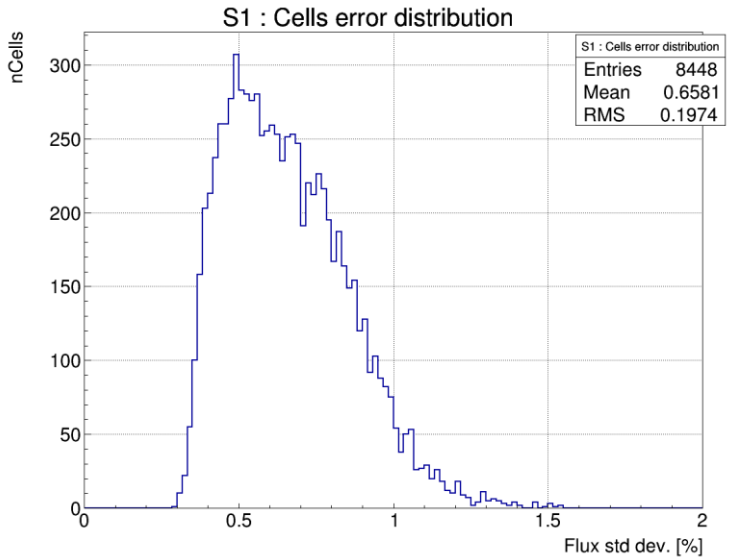
PWR models

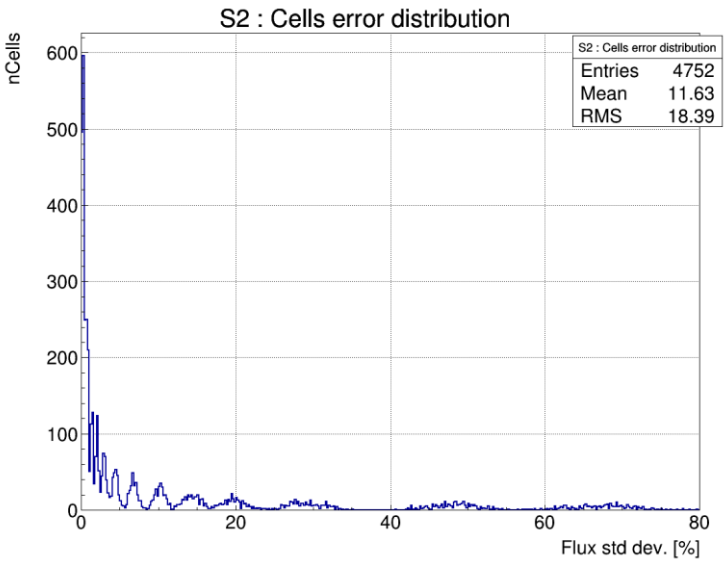

R1 : Cells error distribution
R1 : Cells error distribution
Entries 12828
Mean 0.7057
RMS 0.26
nCells
Flux std dev. [%]

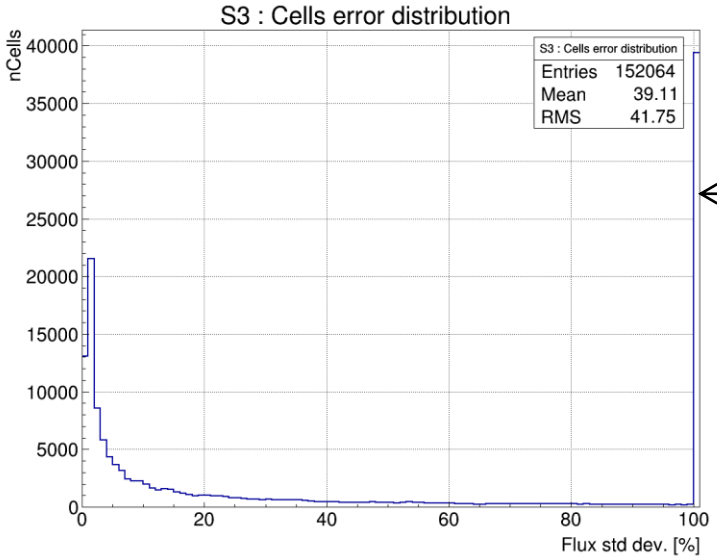

R2 : Cells error distribution
R2 : Cells error distribution
Entries 4752
Mean 1.552
RMS 0.7864
nCells
Flux std dev. [%]


R3 : Cells error distribution
R3 : Cells error distribution
Entries 230904
Mean 3.176
RMS 1.369
nCells
Flux std dev. [%]

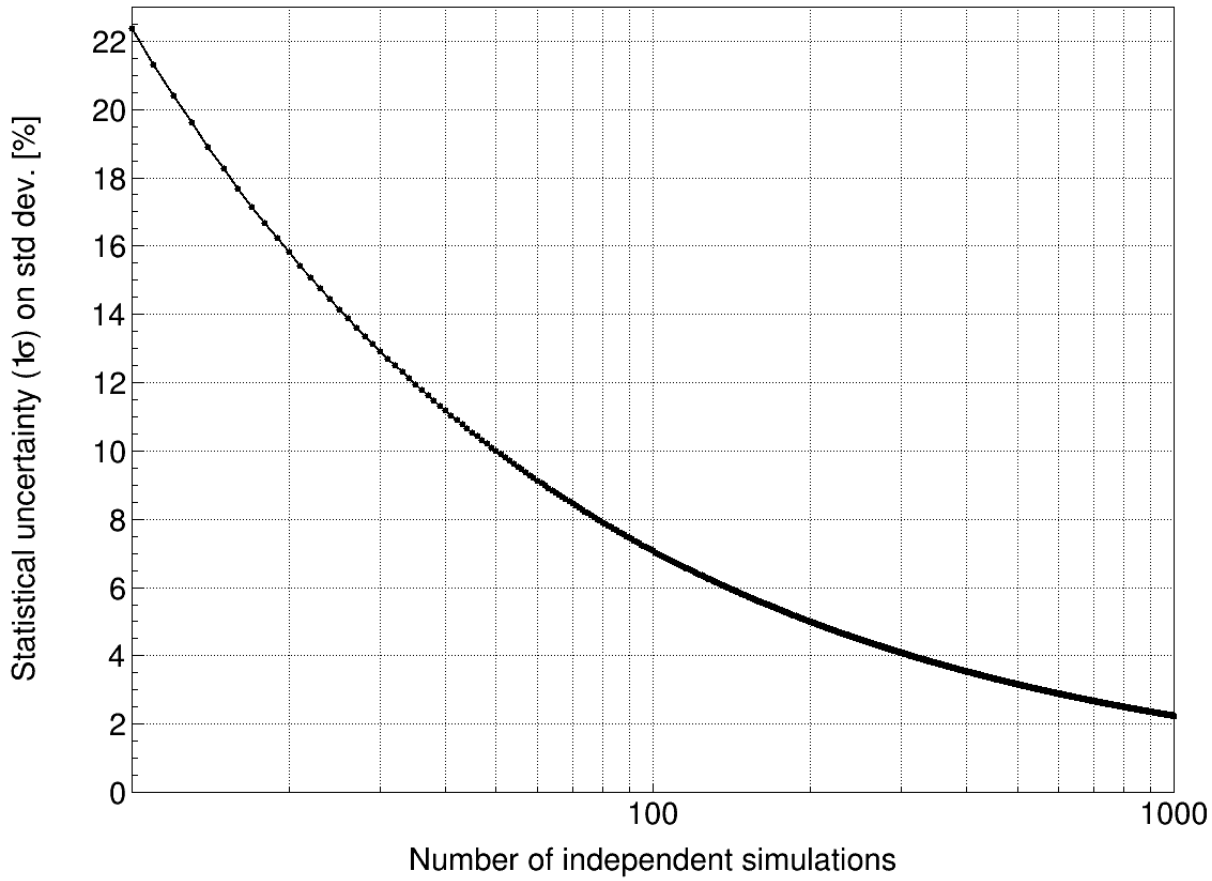
GBC-32 models







26% of elementary fuel volumes



Evolution of statistical uncertainty (1σ) of the standard deviation of a group in fonction 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