Brief description of the CIELO_IAEA "u235ib02i2g6cnu3f2" evaluation for ^{235}U

(Assembled by A. Trkov from various contributions in October 2015)

NOTE:
The present evaluation is an intermediate step in the evaluation process to study sensitivities and the options available in the preparation of the final CIELO evaluation of ^{235}U. It is NOT the final product.

The main features are:

- IRSN v2 resonance evaluation by L. Leal that reproduces the updated Standards based on "microscopic only" fit of thermal constants.
- IAEA beta 2 evaluation in the fast energy range.
- GMA fit of the PFNS at thermal incident neutron energies and the Talou PFNS contributed to the IAEA CRP on PFNS at higher energies.
- Increased nu-bar by 0.2 % in the 100 keV range to match the reactivity of the "bare" assemblies.
- Tweaked thermal nu-bar (relative to our previous data), which is: about 0.1% higher than the new "microscopic" Standards but decreased by up to -0.01 at 0.3ev between 0.2 eV and 0.7 eV (first resonance), by -0.03 at 4 eV, by -0.01 at 11.5ev and by -0.01 at 25ev. Figures 1a and 1b (lin and log scale) show prompt nu-bar in the ENDF/B-VII.1 file (black), our previous tweak (red) and the current one (blue). The Gwin's data (bin representation) normalised to 2.4116 thermal value are also shown (green).

Figure 2 shows what happens after tweaking for selected HST benchmarks that are considered representative of the complete set of cases. In addition to ENDF/B-VII.1 (black), the "u235ib02i2g6cnuf2" is the base case (red).

- With the new thermal nu-bar tweak "u235ib02i2g6cnu3f2" (blue) the gradient with ATLF decreases, without affecting the low-leakage assemblies.
- Adding O-16 by Hale (green) causes an overall decrease of reactivity and further flattening of the ATLF gradient.
- Adding the Argentinian TSL decreases reactivity at intermediate ATLF values; the effect is relatively small but not negligible.

The latest tweaking of nu-bar might not be completely justified. As Vladimir Pronyaev pointed out, there might be some room for increasing the capture to fission ratio in the first resonance, which would have a similar effect. This possibility should be investigated.

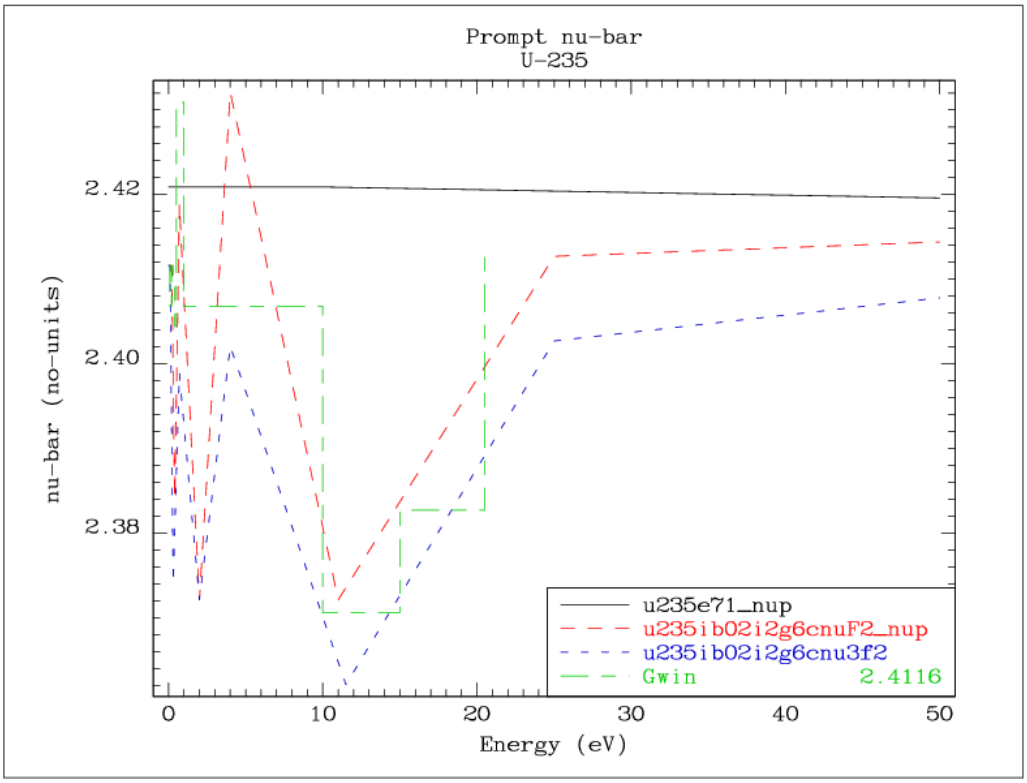

Figure 1a: Prompt nu-bar in the low incident neutron energy range (linear scale).

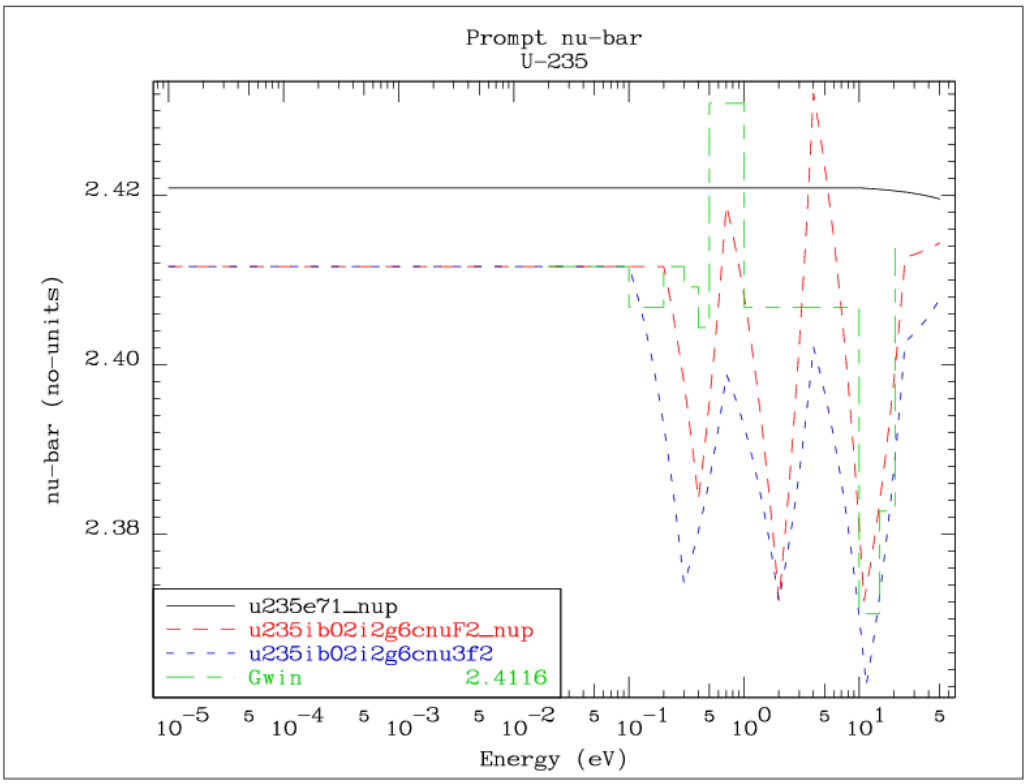

Figure 1b: Prompt nu-bar in the low incident neutron energy range (log scale).

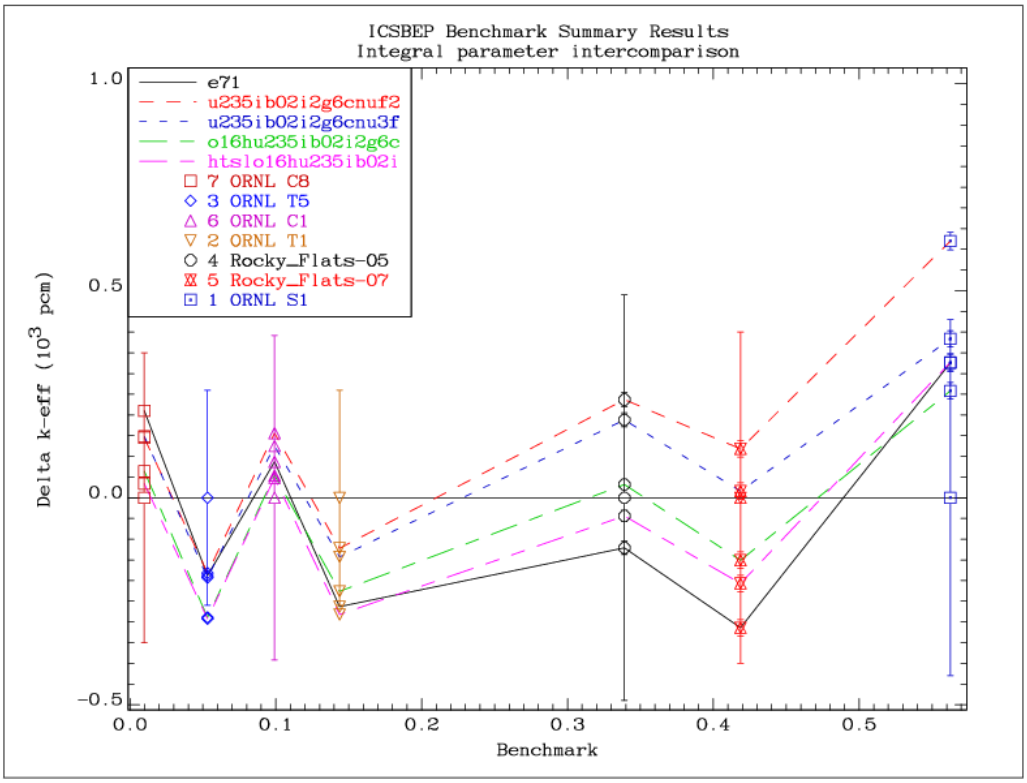

Figure 2: Highly-enriched thermal solution benchmarks.