FEEDBACK ON GND SPECIFICATIONS

C. Jouanne, M. Coste-Delclaux, F. Malvagi

SG38 MEETING, MAI 2015, PARIS

- We support the effort towards a new format

  - To keep into account *old and new* needs

- We tried to (very partially) implement it as an object hierarchy in Python and C++ for our next generation MC transport code prototype (PATMOS) and for our next generation processing code (TREND)

- One (big?) missing point: correlations between products

  - (n,2n), neutrons from fission, gammas, etc.

  - We have applications which demand it

  - We have codes which produce correlated events

  - We shouldn't miss the opportunity to address the issue

- Global hierarchy O.K.

  - All reaction products in one place

  - Fission as just one more reaction (if possible)

  - "MatrixSandwitch" (eigenvalues + eigenvectors) → MC sampling

- Missing:

  - ***Correlations between two products***

    - Ex. (n,2n): we need the distribution of the first neutron, and the distribution of the second **given the first**

- Globally O.K.

  - Am242_m1 is an alias for Am242_e2 : ok

  - Angular correlations between gamma (60Co) : ok

■ XYs $\boxed{f(x)}$

▬ data is interleaved

$$f(x) \leftarrow [x_1, f_1, x_2, f_2, \ldots, x_N, f_N]$$

▬ usage is not

$$f(x) \leftarrow [x_1, x_2, \ldots, x_N], [f_1, f_2, \ldots, f_N]$$

■ MultiD_XYs $\boxed{f(x, y)}$

▬ data is interleaved

$$f(x, y) \leftarrow [y_1, f^{(1)}(x), y_2, f^{(2)}(x), \ldots, y_N, f^{(N)}(x)]$$

▬ usage is not

$$f(x, y) \leftarrow [y_1, y_2, \ldots, y_N], [f^{(1)}(x), f^{(2)}(x), \ldots, f^{(N)}(x)]$$

■ ***Can we have the two forms?***

- Missing container MultiC_XYs(?) $(f^{(1)}, f^{(2)})(x)$

    - Ex. pdf(x), cdf(x)

- *Should we add this (and its MultiD counterpart)?*

Ni Sphere. Neutron fission source
Gamma flux calculations
JEFF-3.1.1 evaluation Ni58

Black : MCNP
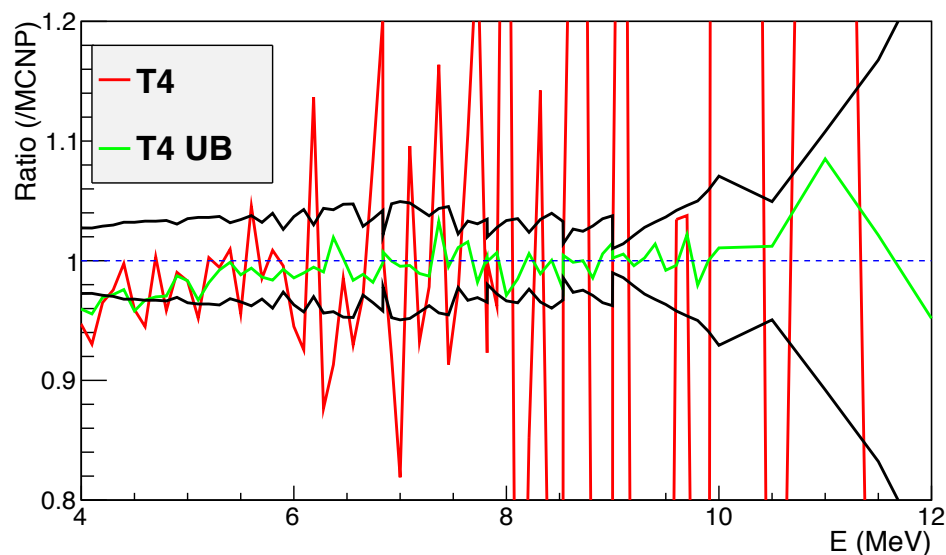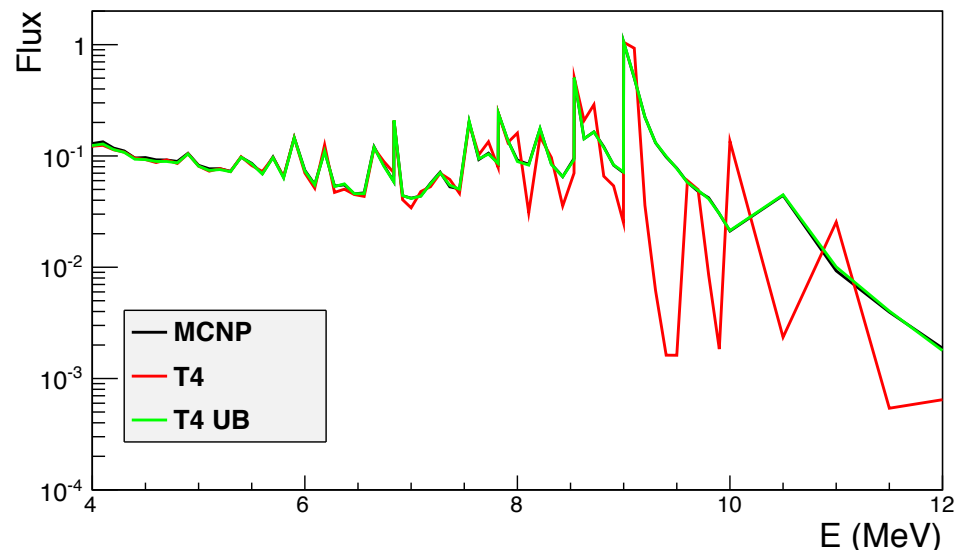Red : TRIPOLI-4 (lin-lin)
Green : TRIPOLI-4 (UB lin-lin)

Physics : UB lin-lin

C.Jouanne & O. Petit
PHYSOR2014 Publication;

56Fe (n,g) reaction MT102 (ENDF-B/VII.1)
- MF 12 : multiplicity for Ein < 1 keV : discrete gamma rays : Ok
- MF15 : multiplicity (histogram) and continuous spectra (histogram) for Ein > 1keV

MF 15 : flat interpolation (int=1) between incident energies
Ein:…,400 keV, 1MeV, 3MeV, 6MeV,10MeV,…
Energy distribution with ≠ energy ranges

400 keV : Eave = 2.91 MeV, Mult = 2.76
$\qquad$ Etot = 8.02 MeV
1 MeV : Eave=2.62 MeV, Mult=3.27
$\qquad$ Etot = 8.60 MeV

990 keV : Etot = 8.02 MeV. Wrong

Flat Interp : $\qquad$ discrete rays : OK
$\qquad$ Energy balance : Wrong

UB : $\qquad$ discrete rays : Wrong
$\qquad$ Energy balance : OK
Lin-Lin (Ein) : $\qquad$ discrete rays : Wrong
$\qquad$ Energy balance : OK

$^{56}Fe(n,\gamma)$ — Yield vs E'_γ (MeV); $E_{in}=400$ keV, $E_{in}=1$ MeV
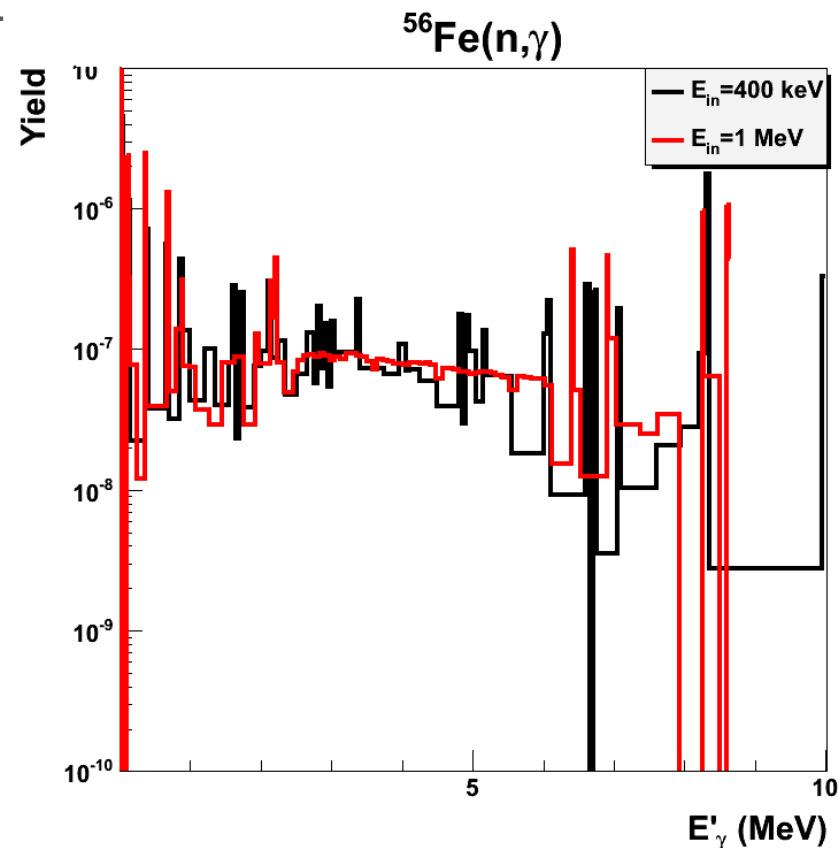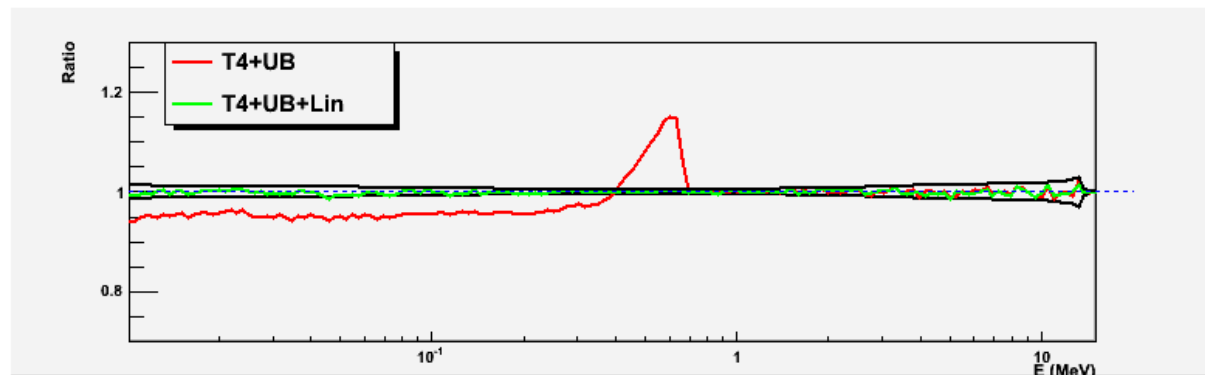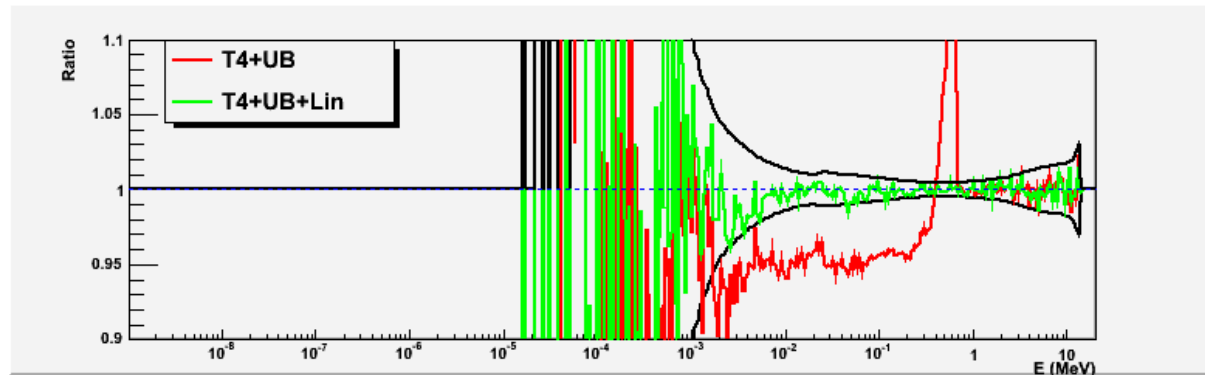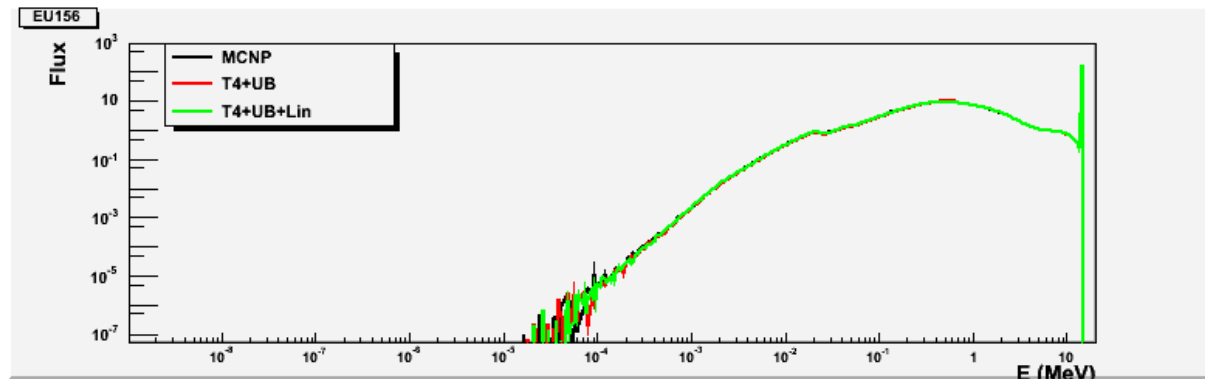
Eu156 Sphere.
Neutron Source = 14 MeV
Neutron flux calculations
ENDF/B-VII.1

MT91, MF5 Energy distribution

Use of combined interpolation
Scheme : lin-lin,lin-log,lin-lin

ACER : Assumption lin-lin
→ renormalisation on same
energy grid.

Extensive use of MT5 reaction : Cr isotopes, K isotopes, W isotopes

No more MT16, MT17, …,MT91,…, MT103….
Only MT2, MT51-91 and MT102 + MT5

 Cross sections for exclusive reaction : Combination between MF3, MF8 and MF10

Energy/Angle distributions MF6 MT5 … -> inclusive distributions

At 14 MeV : $\sigma(MT5) > 0.5 * \sigma(MT1)$

MT5 = (n,n'c) + (n,2n) + (n,3n) +…

Big Problem for analog simulation and energy balance