



~~Requests~~ from Underground Experiments

Requests collected at
Technical Forum Sept.15.2007
@ Hebden Bridge



Muon induced neutrons

Requested by H. Araújo (Imperial Collage) & Luciano Pandola (INFN/LNGS)

- Continue development & validation of muon-nucleus models
 - QCollision + QCaptureAtRest – maybe produces those missing neutrons!
 - Validate inelastic XS, underground muon spectra, depth-intensity relation, etc
- Consider testing for neutron yields with release
 - Disseminate validation results
 - Hadron cascade models – too many gammas, too few fragments?
 - Ion cascade models – to cope with more fragments



Radioactivity

Requested by H. Araújo (Imperial Collage) & Luciano Pandola (INFN/LNGS)

- Open bugs should be closed out! (e.g. #952, #956)
- Radioactive decay module
 - Refine interface to atomic de-excitation (x-rays and Auger)
 - New event generators ($2\nu-2\beta$ decay, non-trivial sources)
 - Small BR decay probabilities
 - Shape of beta spectrum for forbidden transitions (e.g. Ar-39)
- Isotope production
 - `G4IsotopeProduction` development stopped: time to start again more robust approach?
- Metastables
 - The time is right in light of PDG discussion
- (α,n) , (p,n) reactions – e.g. data-driven (HP-type model)
 - Main neutron production mechanism in most experiments (background, calibrations)
- Angular correlation in gamma cascades



Neutron_HP

Requested by H. Araújo (Imperial Collage) & Luciano Pandola (INFN/LNGS)

- Open bugs should be closed out! (eg #821, #675)
- E + p conserved event-by-event in NeutronHPInelastic
- Residual nucleus should always be emitted (when it exists)
 - e.g. $Ge(n,2n)$, capture $(n,>1\gamma)$
- NeutronHPInelastic produces no gammas in some channels
 - E.g. (n,α) and (n,p)
- Clarification on HP database format (esp. final state)
 - If users want to extend it, they need to understand it!
 - Better documentation on format
 - Independent database management tool?
- Can we avoid natural abundance elements in database?
- Main news is new LLBL neutron model based on ENDL database (instead of ENDF-VI). This will include more isotopes (probably all for which there is experimental data!). A new elastic model will probably be out in 1 year, with the inelastic predicted for end 2008 or a little later.
- In neutron_HP, energy/momentum conservation is good in HPElastic and a simple improvement has been suggested for $(n,n'g)$. TK will look into this, since it is the probably the most important case for the community.
- Other reports regarding the missing residual nuclei will be investigated (along with bug reports). The issue of natural abundance isotopes will be looked at, it is suggested that it should generate a warning (missing isotopes already do).

