

Nuclear Physics Requirements

Geant4 Collaboration Meeting

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Outline

- Requirements closed/completed during last year
- Open requirements
- New requirements

Requirements Closed During 2017/2018

- UR-34 (radioprotection and radiophysics)
 - tallying of ambient dose equivalent $H^*(10)$ for shielding design and error estimation
 - $H^*(10)$ is dose equivalent in ICRU sphere at depth 10 cm
 - prototype developed
 - requirement closed and further development moved to 2018 hadronic work plan
- UR-35 (radioprotection and radiophysics)
 - calculation of dose $H^*(10)$ in different time windows
 - prototype solution available
 - requirement closed and further development moved to 2018 hadronic work plan

Requirements Closed During 2017/2018

- UR-36 (radioprotection and radiophysics)
 - computation of activation in bunker therapy by p, n, gamma
 - requirement closed and further development moved to 2018 hadronic work plan
- UR-37 (radioprotection and radiophysics)
 - definition of irradiation profile for radiation therapy
 - likely already covered by biased radioactive decay, but must be verified
 - requirement closed and further development moved to 2018 hadronic work plan

Open Requirements

- None

New Requests

- Fast, realistic γ cascade generator for (n, γ) reactions (CIEMAT)
 - improved type of photon evaporation code
 - based on DICEBOX code
 - already implemented in Geant4
 - benchmarking underway
 - 0.6 FTE total effort / 0.2 FTE expended so far
- Biasing of ParticleHP models (CIEMAT)
 - make them competitive in speed with EM
 - useful for dark matter experiments
 - 0.5 FTE total effort / 0.1 FTE expended so far

New Requests

- Consistency of TENDL (TALYS Evaluated Nuclear Data Library) (CIEMAT)
 - currently three different releases of same library version are not consistent
 - re-establishing consistency benefits all HP users
 - work carried out over 1 - 2 years
 - 0.6 FTE total effort / 0.15 FTE expended so far
- Realistic fission generator (CIEMAT)
 - must produce fragments, neutrons and gammas in a correlated way
 - C++ port of GEF code Useful for dark matter experiments
 - no FTE estimate

New Requests

- Thermal Neutron Scattering Library (CIEMAT)
 - needs to take solid state effects into account
 - some such files already exist, but not for most materials
 - use theory-driven files for various materials
 - no FTE estimate