Exercise: Materials

Advanced FLUKA Course 2019

Goal and setup

- Goal:
  - Practice the use of DPA scoring
  - Experience the effects of SelfShielding
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- Setup:
  - The same as the Biasing exercise (reuse its solution)
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How ? a)

- Radiation Damage: evaluate it for the target, with a
  - Cylindical USRBIN scoring DPA-SCO, bin size consistent with beam width and target size
  - Add MAP-PROP to set DPA threshold. Try (with #if block) two possibilities:
    - Default (30 eV) (warning: units for this card are eV, not GeV)
    - Literature value for W (90 eV)
    - Compare the DPA in the two runs (due to limited statistics, might be useful to compare the integrated value printed by FLAIR)
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- ..while this is running, prepare for part b) on next slide

Where to find DPA thresholds:

* R.E.MacFarlane et al, Nucl. Data Sheets 111, 2739 (2010) (Table 2) *
* A.Yu.Konobeyev et al, Nucl. Energy and Tech. 3, 169 (2017) (Table 4) *
* NEA Report Nuclear SCience NEA/NSC/DOC(2015)9 (Table 2.4) *

How ? b)

- Self Shielding : yes/no/cast-iron-SS
  - Prepare #defines for the three cases: PureIronNoSS, PureIronSS, CastIronSS, and set accordingly the:
    - LOW-MAT
  - note that we do not ask here to define the real composition of cast iron, which has 1.5% to 4% Carbon content, in order to compare three cases with the same iron mass.
  - Run the three cases, compare results