



Exercise 13: Activation

FLUKA Beginner's Course

Exercise: Activation

Aim of the exercise:

- 1- Description of an irradiation profile
- 2- Definition of cooling periods
- 3- Use of EMFCUT card
- 4- Evaluation of activity
- 5- Evaluation of dose equivalent

Exercise: Activation

- ❑ Start from the solution of `ex_Geometry1` (Copy both `.inp` and `.flair` files).:

```
mkdir ex_Activation ;  
cp ex_Geometry1/*.inp ex_Activation ;  
cp ex_Geometry1/*.flair ex_Activation ;  
cd ex_Activation
```
- ❑ Remember to remove *Geometry debugging* ;
- ❑ Add irradiation profile:
 - ❑ 3 irradiation periods of 7 days separated by 4 days of shutdown
 - ❑ Intensity: 10^5 protons/second per each period
- ❑ Consider 2 cooling periods: 1 hour and 1 month
- ❑ Kill the prompt part of the electromagnetic cascade
- ❑ Set 10 keV production and transport thresholds for photons
- ❑ Set 100 keV production and transport thresholds
for electrons and positrons

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For both aluminum and lead and for both cooling times:

- ❑ Add scoring of specific activity in Bq/cm³
- ❑ Do both this with a USRBIN (R- Φ -Z point, unfmt 63) and with a RESNUCLE (unfmd 61 & 62)
- ❑ Persuade yourself the two scorings give the same results

To compare results: format the USRBIN summary file inside FLAIR

For both cooling times:

- ❑ Calculate the dose equivalent rate around the target
- ❑ Use R- Φ -Z USRBIN (unformatted unit 64): X=0 cm , Y=0 cm ,
R: 10 cm 100 bins, Φ : 1 single bin, Z: 200 bins from -5 to 15 cm
- ❑ Use the conversion coefficients for effective dose
(identifier 'EWT74', selected with the AUXSCORE card)

Run 5 cycles x 1000 primaries

ATTENTION: In this case you must build the FLUKA executable with DPMJET and RQMD
(\$FLUPRO/flutil/ldpmqmd)