Exercise: Heavy Ion Interactions

21st FLUKA Beginner's Course

ALBA – Barcelona, Spain

08 – 12 April 2019

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Aim of the exercise:

1- Use of heavy ions beams

2- Use of USRYIELD detector

3- Compile custom executable

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- Start from the solution of ex_Geometry1:

  mkdir ex_HeavyIons

  cp ex_Geometry1/ex_Geometry1.inp ex_HeavyIons/ex_HeavyIons.inp

  cd ex_HeavyIons

  flair ex_HeavyIons.inp (and save as Flair project)

- Replace the proton beam with a oxygen beam of the same energy per nucleon

- Divide INAIR Region into two Regions:

  i) in front and around the target

  ii) behind the target

- Swap water and lead material assignment (to save CPU time)

- Add 2 PHYSICS cards to activate coalescence and evaporation of heavy ions

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- Score the charge spectrum of ions ($3 \leq Z \leq 8$) at the boundaries:
  Lead-Aluminum, Aluminum-Water, Water-CO2
  Add 3 USRYIELD detectors (unformatted unit 68) with:
  1st quantity: particle charge (from 2.5 to 8.5)
  2nd quantity: polar lab angle (from 0 to 90 degrees)

- Score the Linear Energy Transfer spectrum of ions ($3 \leq Z \leq 8$) and of all charged particles ($1 \leq Z \leq 8$) at the end of the target
  Add 2 USRYIELD detectors (unformatted unit 69) with:
  1st quantity: Linear Energy Transfer (from 0.0 to 20.0 keV/(μm g/cm^3))
  2nd quantity: particle charge

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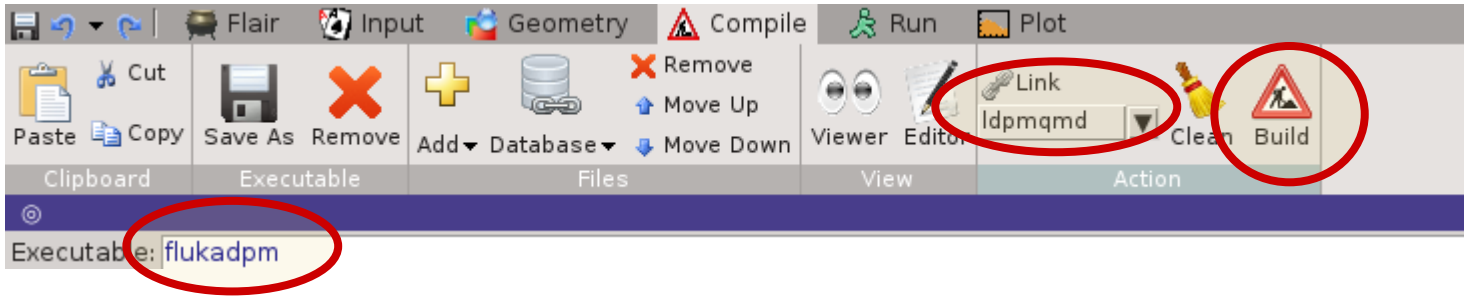
- **REMINDER**:

  In order to run with ions at energies above 125 MeV/n, user should link **dpmjet** and **rqmd** to produce a custom executable.

  `$FLUPRO/flutil/ldpmqmd`

  or alternatively in Flair:



- Run 4 cycles x 500 primaries