



# Exercise 9: Heavy ion beams

Beginners FLUKA Course

# Exercise 9: Heavy ion beams

- create a folder called **ex9**, download the solution of **ex5** (only **ex5.inp**) from the website, rename it to **ex9.inp** and open it in *flair*
- replace the proton beam with an oxygen beam having the same energy per nucleon
- swap the water and lead material assignments (just to save CPU time)
- score the charge spectrum of ions ( $Z \geq 3$ ) at the boundaries between Pb and Al, Al and water, and water and air (at  $z=10\text{cm}$ )

*define a dummy cylindrical region 1 $\mu\text{m}$  thick (5cm radius) between  $z=9.9999\text{cm}$  and  $z=10\text{cm}$*

*add three USRYIELD detectors with particle charge as the first quantity (from 2.5 to 9.5) and polar lab angle as the second quantity (from 0 to 90 deg), use unformatted unit 90*

- score the LET spectrum (in water) of ions ( $Z \geq 3$ ) and charged particles at the end of the target

*add two USRYIELD detectors with Linear Energy Transfer [given in  $\text{keV}/(\mu\text{m g}/\text{cm}^3)$ ] as the first quantity (from 0.0 to 20.0) and particle charge as the second quantity (from -2.5 to 9.5), use unformatted unit 89*