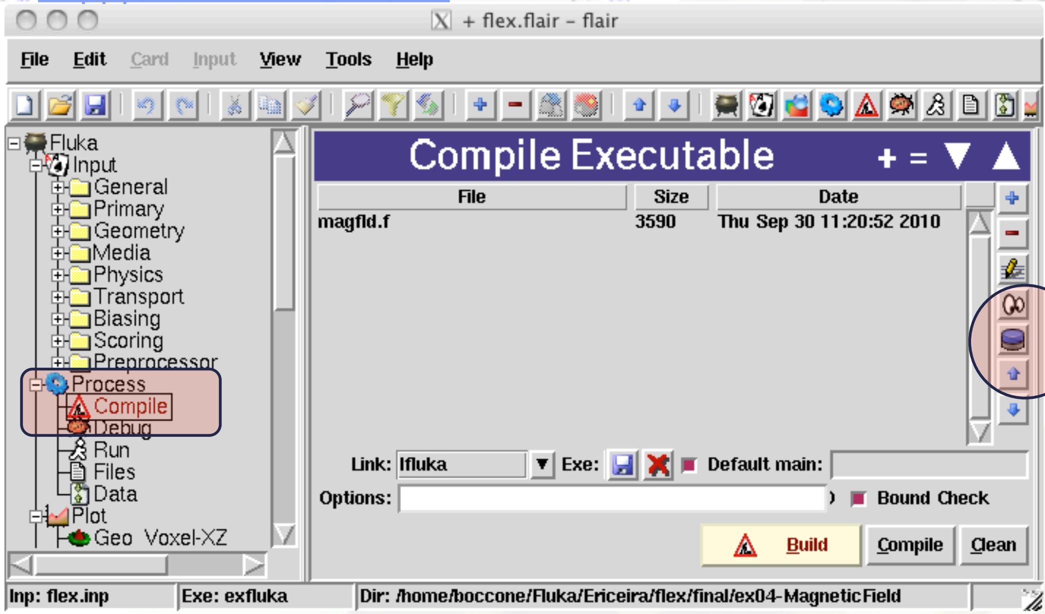
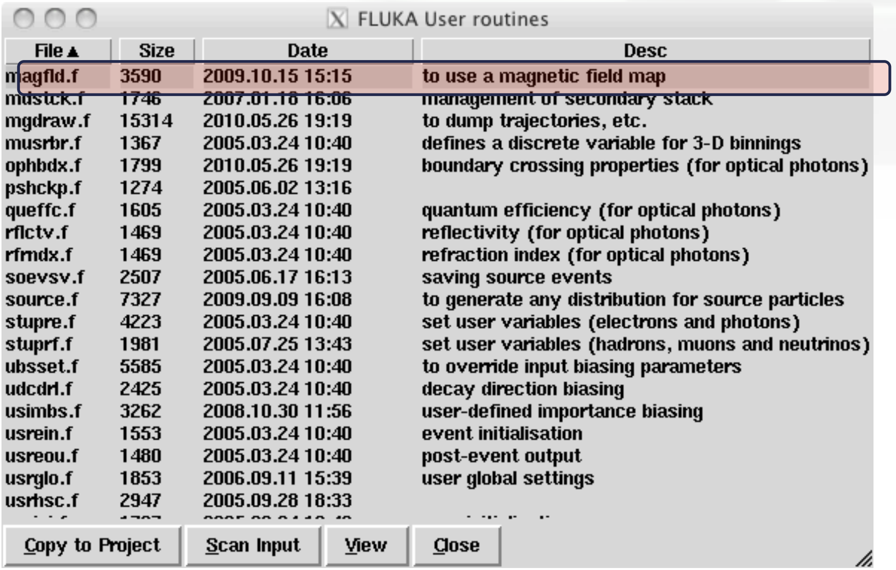
Fluka Exercise – Day 3

Hands on Fluka

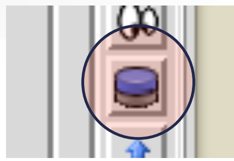
Ex04 – Magnetic Field





- GOAL: include the magnetic field of the dipole and the 4 quadrupoles Place a pencil beam at the beginning of the vacuum pipe and make it go through the elements of the beam line (w/o hitting them…). Calculate the proton tracklength in the magnets.

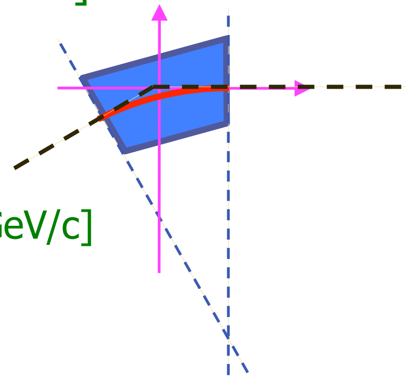
- Recipe:
  - Add the MGNFIELD card to set the tracking accuracy in mag. field and declare the mag. regions though ASSIGNMA
  - Add a magnetic field routine with flair from the *Process->Compile* then click on

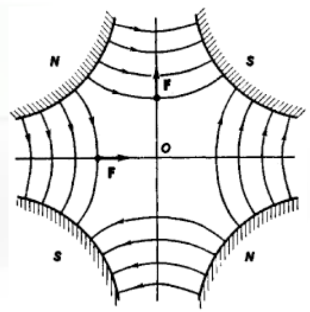


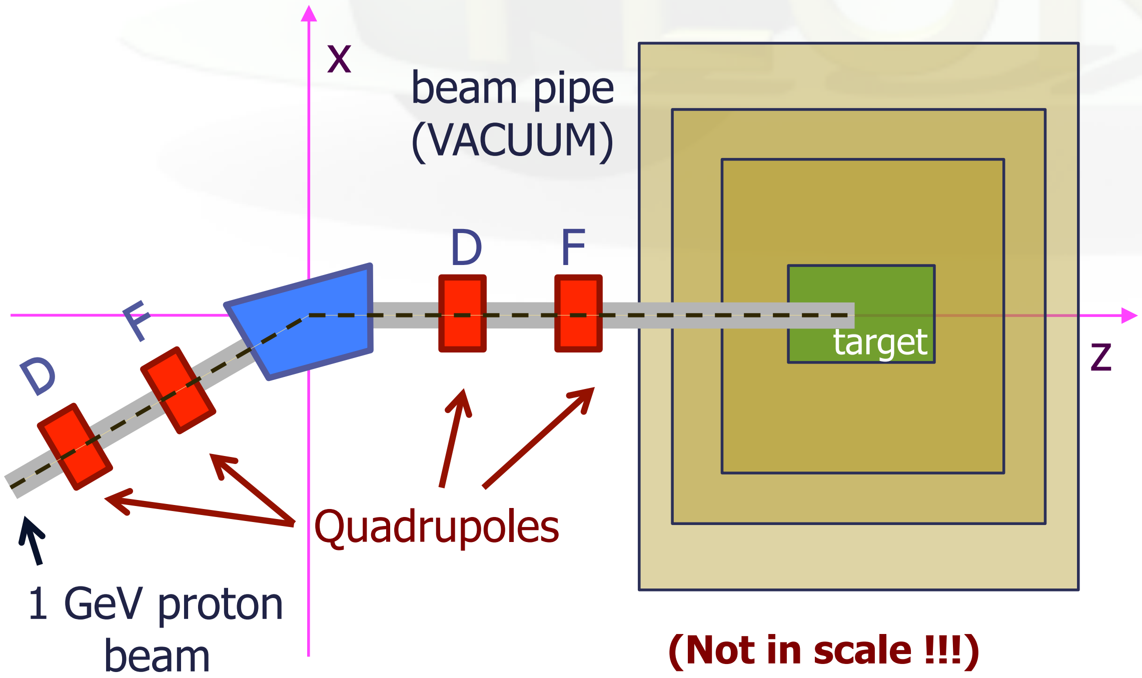
  - Select the *magfld.f* routine from the menu then click on *Copy to Project*.
  - Suggestion: you might add a suffix to the filename (like *"_mod"*) to distinguish from the original

Ex04 – Magnetic Field

- To support rotation and lattice identification include in your routine also (RTDFCM) [RoTation DeFinition CoMmon] and (LTCLCM) [LaTtice CeLl CoMmon]
- DIPOLE:
  - Field B [T] = p [GeV/c] / (ρ [m] * 0.2998)
- QUADRUPOLES:
  - Gradient g [T/m] = p [GeV/c] * k [m^{-2}] / 0.2998, take g [T/m]=p [GeV/c]
  - Focusing: B_x, B_y, B_z = (+Gradient * y[m], +Gradient * x[m], 0)
  - Defocusing: B_x, B_y, B_z = (-Gradient * y[m], -Gradient * x[m], 0)







(Not in scale !!!)

Use the routines DOTRSF and UNDRTO to define and rotate the quadrupole field, respectively, according to the proper ROT-DEFI transformation, which is given by GEON2L

Ex05 – Source

- GOAL: use the beam characterized in the *ex05-Source/particles.dat* file distribution
- Recipe:
  - Add a source routine with flair from the *Process->Compile* (as done for *magfld.f*);
  - Modify it in order to read an external ASCII file (4 columns: x[cm], x'[rad], y[cm], y'[rad]).
  - Get the other relevant beam parameters from the WHATs of the SOURCE card as shown in the following example:

```
[...]
*  |  *** User initialization ***
c         these were given using the SOURCE card
         LUNRD = NINT(WHASOU(1))
         BSTART = WHASOU(6)
         BANGLE = WHASOU(5)
[...]
```

  - Load the beam at s=-850cm

Ex06 - USERDUMP

- GOAL: Use the USERDUMP card to *dump* the particle informations (x[cm], x'[rad], y[cm], y'[rad]) at different locations to different files. Plot the x-x' and y-y' distributions (for example with gnuplot or ROOT).

- Recipe:
  - Add a mgdraw routine with flair from the *Process->Compile* (as done for *magfld.f*);
  - Modify it in order to write an external ASCII file (4 columns: x[cm], x'[rad], y[cm], y'[rad]) at the boundaries of interest.
  - Use the provided *gnuplot* instruction file to visualize the beam profile evolution