

### Fluka Exercise – Day 3

Hands on Fluka



Card Input View Tools Heli File Edit 🍯 🖏 📬 🥸 🛦 🗭 🍰 🖆 DI 📂 🗔 4 --Fluka **Compile Executable** + =🗄 🔄 General File Size Date Primary maqfld.f 3590 Thu Sep 30 11:20:52 2010 Geométry a⊡Media 1 Physics + Scoring Process Compile - 23 Run - 13 Files - 13 Data Link: Ifluka 🔻 Exe: 🛃 💥 🔳 Default main: Options: ) 🔳 Bound Check Plot Teb Geo Voxel-XZ Build Compile Clean Exe: exfluka Dir: /home/boccone/Fluka/Ericeira/flex/final/ex04-MagneticField Inp: flex.inp

000 X FLUKA User routines Date File 🛦 Size Desc aqfld.f 2009.10.15 15:15 to use a magnetic field map 3590 m<del>ustek.</del>f 2007.01.18 16:06 management of secondary stack 17462010.05.26 19:19 mgdraw.f 15314 to dump trajectories, etc. musrbr.f 1367 2005.03.24 10:40 defines a discrete variable for 3-D binnings 1799 ophbdx.f 2010.05.26 19:19 boundary crossing properties (for optical photons) pshckp.f 1274 2005.06.02 13:16 queffc.f 1605 2005.03.24 10:40 quantum efficiency (for optical photons) rflctv.f 1469 2005.03.24 10:40 reflectivity (for optical photons) 1469 2005.03.24 10:40 refraction index (for optical photons) rfmdx.f soevsv.f 2507 2005.06.17 16:13 saving source events 2009.09.09 16:08 source.f 7327 to generate any distribution for source particles stupre.f 4223 2005.03.24 10:40 set user variables (electrons and photons) 2005.07.25 13:43 set user variables (hadrons, muons and neutrinos) stuprf.f 1981 ubsset.f 5585 2005.03.24 10:40 to override input biasing parameters udcdrl.f 2425 2005.03.24 10:40 decay direction biasing usimbs.f 3262 2008.10.30 11:56 user-defined importance biasing 1553 2005.03.24 10:40 event initialisation usrein.f usreou.f 1480 2005.03.24 10:40 post-event output usralo.f 1853 2006.09.11 15:39 user global settings usrhsc.f 2947 2005.09.28 18:33 . ... .. ... Copy to Project Scan Input View Close

**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:

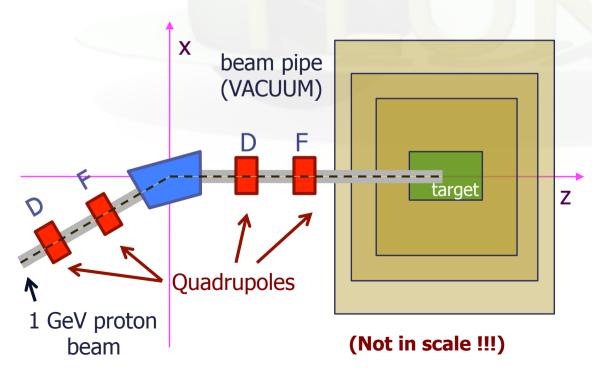
- Add the MGNFIELD card to set the tracking accuracy in mag. field and declare the mag. regions though ASSIGNMA
- Add a magnetic field routine with flair from the *Process->Compile* then click on



- 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

# 04 – 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-<sup>2</sup>] / 0.2998, take g [T/m]=p [GeV/c]
  - Focusing: B<sub>x</sub>, B<sub>y</sub>, B<sub>z</sub> = (+Gradient \* y[m], +Gradient \* x[m], 0)
  - Defocusing: B<sub>x</sub>, B<sub>y</sub>, B<sub>z</sub> = (-Gradient \* y[m], -Gradient \* x[m], 0)

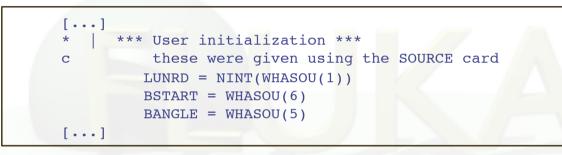


Use the routines DOTRSF and UNDRTO to define and rotate the quadrupole field, respectively, according to the proper ROT-DEFI transformation, which is given by GEON2L

### 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:



Load the beam at s=-850cm

05 - Source

# x06 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