Exercise 4: Magnetic Field

FLUKA Advanced Course

Exercise 4a

- ### Goal

  Modify the magfld.f routine from the exercises directory, for properly setting fields of the accelerator beam line previously built;

- ### Requirements

  - Analytical expression of fields:

    - dipole: constant in space, vertically directed (i.e. horizontal bending);

    - Quadrupole: linear with transverse position on the local reference frame:

      $$B_{hor} = g * y; \qquad B_{ver} = g * x;$$

      g is the gradient (T/m), x /y is the transverse position on the local reference frame (i.e. centred around the magnet axis);

  - Magnetic settings:

    - Dipole field: the one of the previous exercise;

    - Quadrupole gradient: 4.9 T/m;

Exercise 4b

- Goal

  shoot the beam through the entire beam line, and check the evolution of the beam position/profile in selected points;

- Requirements

  - Activate the needed magnetic field regions (**ASSIGNMA** and **MGNFIELD** cards);

  - Check that the sequence of quadrupoles is *Defocussing-Focussing – Focussing-Defocussing* (starting from the dipole);

  - Link the magfld.f routine and compile Fluka;

  - Use the same **USRBIN** detectors as those used when building the accelerator beam line;

Exercise 4b (II)

- Tips & Suggestions:

    - What is the net effect of the quadrupoles?

- Variations:

    - Displace vertically the first quadrupole: what does it happen at the end of the line?