Exercises

FLUKA Tutorial

Exercise 6

Study case

Nuclear Medicine application

Goal

Import the DICOM CT image in FLAIR and convert it in a VOXEL geometry, define a $_{90}$USRBIN energy scoring as the patient volume and define a spherical Y source.

Requirements

Settings:

ISOTOPE sdum in the BEAM card.

DEFAULTS card with EM-CASCA.

Define $_{90}$Y in the HI-PROPE card (A=90 and Z=39).

Define a spatially extended source shaped as a sphere using the BEAMPOS card (SDUM = SPHE-VOL).

Radioactive decays activated in semi-analogue mode (RADDECAY).

GLOBAL card in case you want to increase the maximum number of regions (useful with VOXEL geometry starting from DICOM CT images).

Scoring:

Define Cartesian scoring for absorbed energy via the USRBIN card with the same dimension of the patient CT but with NBINX=NBINY=256.

Run 5 cycles of 10^5 histories each.

Exercise 7

Study case

Particle-therapy application

Goal

Import the DICOM CT image in FLAIR and convert it in a VOXEL geometry. Position the VOXEL geometry 70 cm in z-direction with ROT-DEFIni to target the abdomen. Score a dose with USRBIN from two angles (0 deg, 180 deg) and merge FLUKA outputs. Convert FLUKA output to (Gy).

Requirements

Settings:

SOURCE card with I) WHAT(1) = 0. and II) WHAT(1) = 180.; WHAT(2) = Proton Energy (MeV) [200 MeV, 250 MeV]

BEAM card with sdum PROTON and WHAT(1) = 0.400

DEFAULTS card with HADROTHE.

Include user-written source_Ex7.f to compile custom executable.

ROT-DEFIni card for translation and rotation of the VOXEL geometry.

Geometry with at least 5 m of vacuum and 1 m of air surrounding the VOXEL geometry.

GLOBAL card in case you want to increase the maximum number of regions (useful with VOXEL geometry starting from DICOM CT images).

Scoring:

Define Cartesian scoring for absorbed energy via the USRBIN card with the same dimension of the patient CT but with NBINX=NBINY=256. Merge the scoring output of for WHAT(1) = 0 and WHAT(1) = 180.

Run 2 cycles I) and II) with 1.25E5 histories each.