VITESS guide exercises

Straight guide

As basis for the following exercises create an instrument consisting of a source and a straight guide.

Source: A disc with 12 cm diameter emitting a constant (with wavelength) spectrum (use constant.mod + constant.dat, these files are provided), 150 cm distance to guide**. The wavelength band is between 1 and 9 A everywhere. Use at least 2e6 trajectories.**
Guide dimensions: 6x6 cm² cross section, length 20 m

Curved guide:

Create an instrument comprising a curved guide or a channeled curved guide ("bender" option in the guide module). Use two coatings, first m=1 (mirr1a.dat) and then m=3 (mirr3opt.dat). How does the performance of both guides compare for different coatings?

Details:
Source: A disc with 12 cm diameter emitting a constant (with wavelength) spectrum, 150 cm distance to guide
Guide dimensions: 6x6 cm² cross section, length 20 m, curvature radius 1000 m.
Bender dimensions: 6x6 cm² cross section, length 20 m, curvature radius 1000 m, 10 channels of 0.3 mm thickness each.
Coatings: m=1 and m=3
Slits: 1st slit: 3(width) x 6(height) cm² 50 cm away from the guide exit; 2nd slit: 1.5x6 cm² 5 m away from the first slit
Monitors: Wavelength, 2d position, 2d posy-divy after the guide (bender); wavelength monitor after slits

Kinked guide:

A curved guide can be approximated by straight sections that are rotated with respect to each other. Create an instrument comprising a kinked straight guide using the frame module needed for coordinate transformations. Kink the guide in y-direction. How does the performance compare with the curved guide? What can be observed in the divergence distribution after the guide?

Details:
Source: A disc with 12 cm diameter emitting a constant (with wavelength) spectrum, 150 cm distance to guide
Guide dimensions: Section1: 6x6 cm² cross section, length 5 m; Section2: 6x6 cm² cross section, length

10 m, rotated by 0.5° with respect to section1; Section3: 6x6 cm² cross section, length 5 m, rotated by 0.5° with respect to section2; (what is the total kink of the guide system in cm?)
Coatings: m=3
Slits: 1st slit: 3(width)x6(height) cm² 50 cm away from the guide exit; 2nd slit: 1.5x6 cm² 5 m away from the first slit
Monitors: Wavelength, 2d position, 2d posy-divy after the guide (bender); wavelength monitor after slits

Ballistic guide:

A simple ballistic guide should be compared both with the simple straight guide and an elliptic one.

Details:
Source: A disc with 12 cm diameter emitting a constant (with wavelength) spectrum, 150 cm distance to guide
Guide dimensions: 6x6 cm² cross section at start, 12x12 cm² cross section after 5 m until 15 m, 6x6 cm² cross section at 20 m.
Monitors: 2D Position, two 1D (y & z) position monitors, 2D divergence, wavelength monitor at 150cm after guide exit

Elliptic guide:

An elliptic guide of similar dimensions should be compared with the performance of the ballistic guide. At 150cm away from the guide exit, both the total beam intensity and the flux within a 2x2 cm² square (e.g. realized with a slit) should be studied. The same should be repeated with a reduced source size of 2 cm diameter.

Details:
Source: A disc with 12 (and 2) cm diameter emitting a constant (with wavelength) spectrum, 150 cm distance to guide
Guide dimensions: 6x6 cm² cross section at entry and at 20 m, foci 150 cm away from guide entry/exit, respectively. The VITESS guide component gives values for the corresponding half axes: a = 11.500 m, b = 0.060 m.
Monitors: 2D Position, 2D divergence, two 1D (y & z) position monitors, wavelength monitor at 150cm after guide exit (full beam and 2 x 2 cm², the same for ballistic guide). Wavelength monitor after 2x2 cm² slit for all guide types.