Subject: Problem with Root geometrys from CAD
Posted by Christian Hammann on Thu, 06 May 2010 09:14:52 GMT
View Forum Message <> Reply to Message

Hi all

I was trying to create a geometry for proto60 emc prototype using the CadConverter. The created geometry looks correct but I get some problems in the Geant4 simulation.

To find the source of the problem I reduced the geometry to a single crystal. The shape of the crystal is a Trapezoid (can be described by a TGeoTrap). It has two parallel endfaces and two sides which are orthogonal to the endfaces and each other.

The CadConverter creates these shapes as TGeoArb8.

I modified the code of PndEmc slightly to read the Root file and parse the volume name etc, similar to the code for the forward endcap part.

I tested the geometries by generating photons in front of the crystal with random position in x and y. Also a small angle to the z-axis is generated.

When I run the simulation I observed three problems, affecting primary and secondary particles alike. It is likely that these problems have the same cause.

The first problem I get is that a particle seems to get "stuck" at the surface of a Crystal, the particle is transported into and out of the crystalvolume indefinetly:

*** Particle reached max step number (10000). ***

****
* G4Track Information: Particle = gamma, Track ID = 88, Parent ID = 81
****

Step#	X(mm)	Y(mm)	Z(mm)	KinE(MeV)	dE(MeV)	StepLeng	TrackLeng	NextVolume	ProcName
10002	-11.6	-22.2	990	0.703	0	0	1.07	CrystalType6a	Transportation
10003	-11.6	-22.2	990	0.703	0	0	1.07	cave	Transportation
10004	-11.6	-22.2	990	0.703	0	0	1.07	CrystalType6a	Transportation
10005	-11.6	-22.2	990	0.703	0	0	1.07	cave	Transportation

This can also be seen in the event display: The track of this particle ends at the surface of the crystal.

A second problem can be seen in the eventdisplay, where a particle would clearly enter the volume, but have no reactions inside the volume. This could, for example, lead to a 100 MeV photon crossing 10cm of PWO without any reaction.

Problem three can be seen when one plots the position of EmcPoints for a singe crystal. One would expect to find them all inside the crystalvolume, but I observed quite a lot of points with a position outside of the volume.

I have tried to narrow the problem down. I checked that the center of the volume in the cad file is at the geometrical center of the shape. The dimensions of the created TGeoArb8 are correct. The vertices of the endfaces are specified in the correct clockwise order.

The positioning of the volume makes a difference: If I place the crystal on the z-axis I observe no problems. Only if the crystal is not on that axis (as is the case for the proto60) I get the problems mentioned above.

I tried to create a root geometry by hand to reproduce these errors, but all handmade geometries worked for me. This could be a hint that the problem is connected to the cad converter.

On the other hand the error I get from Geant 4 is the same as the one mentioned by Dmitry in his post (http://forum.gsi.de/index.php?t=rview&th=2816).

I also tried using geant3 and I had no problems there.

I have no ideas what else I could try to solve that problem, so any help would be welcome.
If you want to have a look at some of the files (code, rootfiles, cadfiles ...) just tell me what you need.

Thanks very much

Christian