Subject: My puzzle with GEANE cov matrix
Posted by Ralf Kliemt on Wed, 01 Jun 2011 12:22:58 GMT
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Hello GEANE experts,

I have a puzzle concerning track parameter propagation and the covriance matrices. I already contacted Lia via mail, but want to share my investigations.

We have the following situation: A track is defined with its first parameter set yielding the following cov matrix:
Start MARS cov (px,py,pz,E,x,y,z):
6x6 matrix is as follows

	0	1	2	3	4	5
0	4.059e-05	3.814e-05	-9.897e-05	-2.728e-07	-8.99e-07	0
1	3.814e-05	3.77e-05	-9.529e-05	1.051e-06	-2.188e-06	0
2	-9.897e-05	-9.529e-05	0.000248	-2.797e-06	2.073e-06	0
3	-2.728e-07	1.051e-06	-2.797e-06	7.092e-06	5.262e-08	0
4	-8.99e-07	-2.188e-06	2.073e-06	5.262e-08	7.082e-06	0
5	0	0	0	0	0	0

After propagating the track parameters to the distance of closest approach of the z axis, I get the following cov:
End MARS cov (px,py,pz,E,x,y,z):
6x6 matrix is as follows

	0	1	2	3	4	5
0	5.94e-05	-1.932e-06	2.146e-05	-0.000288	9.157e-06	-0.0001177
1	-1.932e-06	5.631e-05	1.295e-05	2.375e-05	-0.000268	-8.752e-05
2	2.146e-05	1.295e-05	0.0002708	-0.0005018	-0.0004349	-0.0003691
3	-0.000288	2.375e-05	-0.0005018	0.002029	0.0004619	0.001021
4	9.157e-06	-0.000268	-0.0004349	0.0004619	0.001822	0.000857
5	-0.0001177	-8.752e-05	-0.0003691	0.001021	0.000857	0.0007408

Looking at x,y,z (cols/rows 3,4,5) I get massively increased error values, like from sigma_x=27um to sigma_x=450um.

The residuals look really OK and even the pull distributions for the momenta are well, considering that the beam pipes material blows the cov a bit up.
I can only imagine there is some mismatch between the fortran units and Fairsoft (cm) or a too large contribution of the beam pipe.

I looking forward to some ideas.

Regards. Ralf

Subject: Re: My puzzle with GEANE cov matrix

Posted by Lia Lavezzi on Thu, 02 Jun 2011 10:04:59 GMT
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Hi Ralf,
sorry for the late reply, I thought I could have a look to the code you sent me this week, but I could not. You know, I am very busy with the STT code... I will try to find some time for GEANE too.

Concerning the mismatch between fortran and fairroot units I would exclude this, since we made several tests (pulls and residuals) and we always got good results, so any mismatch should have shown up also before.

I have a couple of questions: which pdg code are you using to propagate and where are you propagating from in this specific event? What are your starting point and momentum?

Cheers,
Lia.