
Subject: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Thu, 27 Sep 2007 12:09:32 GMT
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Hi!

The geane coordinate system is different from the panda coordinate system. In geane the beam is going along x: $(x,y,z) \rightarrow (z,y,-x)$

Why is this so? In principle GEANE does not need the information of the beam axis. All relevant information is in the geometry and the field. Both data sets are available in the panda coordinate system. Where are they converted?

Using two different coordinate system creates a mess in the tracking.

Regards, Sebastian.

Subject: Re: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Thu, 27 Sep 2007 12:56:16 GMT
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Furthermore I am a bit puzzled about TrackParP. Andrea you said this would be $(q/p, v, w, v', w')$.

In the code Mohammad made a comment which says: $(v, w, v', w', q/p)$

Now what is right? How are the covariances ordered?

Cheers!
Sebastian.

Subject: Re: URGENT: geane - coordinate system
Posted by [Andrea Fontana](#) on Thu, 27 Sep 2007 13:46:48 GMT
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Hi Sebastian,
the reason why the geane system is with beam along x axis is, as far as I know, historical and we had adopted this convention to properly call geane. We can perhaps think of a different approach, but in all our tests it did not seem necessary so far.

Regarding CbmTrackParP, I think the comment is not correct: all the calculations in SD are internally done with the convention $(q/p, v', w', v, w)$. See for instance the calculation of the covariance matrix in SD, where we write:

```
...  
fDQp = TMath::Sqrt(fabs(fCovMatrix[0]));  
fDTV = TMath::Sqrt(fabs(fCovMatrix[5]));  
fDTW = TMath::Sqrt(fabs(fCovMatrix[9]));
```

```
fDV = TMath::Sqrt(fabs(fCovMatrix[12]));  
fDW = TMath::Sqrt(fabs(fCovMatrix[14]));  
...
```

See also our report for the SD definition.
Hope this helps.

Ciao,
Andrea

Subject: Re: URGENT: geane - coordinate system
Posted by [Andrea Fontana](#) on Thu, 27 Sep 2007 13:49:16 GMT
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Dear all,

regarding the comments in geane and trackbase, I am working
on them. Some are obsolete and need to be removed.

Andrea

Subject: Re: URGENT: geane - coordinate system
Posted by [Lia Lavezzi](#) on Thu, 27 Sep 2007 14:04:43 GMT
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Hi Sebastian,

concerning the beam direction and the coordinate difference, the particle direction is along
the x axis in the transverse (curvilinear) frame, the so called SC: you can always change the
reference system from the SC to the master reference system using the function
FromSCToMars in CbmGeaneUtil.
Hope this helps.

Ciao,
Lia.

Subject: Re: URGENT: geane - coordinate system
Posted by [Andrea Fontana](#) on Thu, 27 Sep 2007 14:09:08 GMT
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Hi again,

Lia and I just had a brief discussion on this thread and
we believe that in some cases the transformation
(x,y,z) -> (z,y,-x) that we tried at GSI the other day
works correctly, but it is not general. The correct way
to transform is the FromSCToMars suggested by Lia: in this
way the transformation between the two systems is properly
taken into account.

Ciao,
Andrea

Subject: Re: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Thu, 27 Sep 2007 15:17:01 GMT
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Hi!

I will think about the $(x,y,z) \rightarrow (z,y,-x)$ transformation again. However we do not need (and I do not use) SC (at the moment). Only SD and in this case there is no need to have any one distinguished axis.

My question is: where is the transformation done for the Geometry and the Field?

Anyhow - I am working on GeaneTrackRep to hide all this.

Sebastian.

Subject: Re: URGENT: geane - coordinate system
Posted by [Andrea Fontana](#) on Thu, 27 Sep 2007 15:32:59 GMT
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Hello Sebastian,
we do not understand exactly why a transformation should be done for the geometry and the field.
In CbmTrackParP the track is defined in the SD system with a detector plane defined by the user: the track parameters and the errors are calculated on this plane but the tracking internally (in ERTRAK) is done always in MARS. So there is no need to transform geometry and field.
Perhaps we did not understand your question: if our reply is not satisfactory, can you please add more details to your question?

Andrea and Lia

Subject: Re: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Thu, 27 Sep 2007 15:38:00 GMT
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Hi!

My question is only this: Are the coordinates of our geometry transformed in geane? Probably not. So why do we have to do the trafo at all? The only reason would be, that we want the SC angles to be measured with respect to the beam, right?

Sebastian.

Subject: Re: URGENT: geane - coordinate system
Posted by [Andrea Fontana](#) on Thu, 27 Sep 2007 16:00:15 GMT
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Hello,

there is no coordinate transformation: geane tracks in MARS.
The only transformations are in the definition of the track parameters and in their errors calculation: these can be done in SC or SD and can be transformed in MARS after the tracking. At this point MARS for geane is identical to MARS for Panda.

In the first tutorial we shot along x axis, but it was only to keep things simple: in the second tutorial we shot isotropically in the Panda (MARS) system, so there is nothing special about x axis. In SC angles are already defined in MARS as azimuthal and polar angles. If the track is in SD you have to calculate them by transforming to SC.

We hope this is clear now.

Ciao,
Andrea and Lia

Subject: Re: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Fri, 28 Sep 2007 09:40:04 GMT
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Hi!

Ok. Very good! Thank you for the clarification. So we do not need to bother with any transformation, because all that is needed is already in TrackParP.

Cool! Sebastian.

Subject: Re: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Fri, 28 Sep 2007 12:17:31 GMT
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Hi!

I have look into CbmTrackParP and I found the place where the confusion sets in:

`TVector3 positionsd = util.FromMARSToSDCoord(TVector3(fX, fY, fZ), forigin, fiver, fjver,`

```
fkver);  
fU = positionsd.X(); // CHECK  
fV = positionsd.Y(); // CHECK  
fW = positionsd.Z(); // CHECK
```

Since fV and fW are used in the trackrepresentation it is implicitly assumed, that X is along the track. So it has indeed nothing to do with the beam-axis.

In other words:

I would like to have: pos=(1,1,0) mom=(0.1,0,1) in MARS

when being projected onto a plane
o(0,0,0) u(1,0,0) v(0,1,0)

to give
v=1; w=1; v'=0.1; w'=0;

this is currently not the case because of the code shown above.
instead one would get
u=1; v=1; u'=0.1; v'=0;

In principle we should use fU and fV or build in some conversion somewhere.
Still thinking about it....

Cheers! Sebastian.

Subject: Re: URGENT: geane - coordinate system
Posted by [Sebastian Neubert](#) on Fri, 28 Sep 2007 12:23:23 GMT
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Hi!

So understood some more.

The problem is that I interpret my DetPlane different than the geane-convention.

I always think that the detectorplane is spanned by x and y (which could be rotated to u and v).

In Geane v,w (corresponding to y,z) of the plane are assumed to span the plane.

...

Subject: Re: URGENT: geane - coordinate system

Posted by [Sebastian Neubert](#) on Fri, 28 Sep 2007 13:07:30 GMT

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Hi!

Ok. It works. Sorry for the confusion!
There will be demo with the GeaneTrackRep in Action soon.

Cheers and have a nice Weekend! Sebastian

Subject: Re: URGENT: geane - coordinate system

Posted by [Sebastian Neubert](#) on Fri, 28 Sep 2007 14:05:49 GMT

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Hi!

In recotasks/demo

there is a demo script which shows how the GeaneTrackRep and a DemoRecoHit are used to calculate residuals.

Cheers!
Sebastian.
