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Subject: how to convert kinematic variables from lab frame to cm frame in root  
Posted by [Ajay Kumar](#) on Mon, 03 Jun 2013 06:56:10 GMT

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Hello everyone,

I know the Theta distribution of two body decay reaction in the laboratory frame. I need to convert Theta\_lab distribution in to Theta\_CM distribution for my analysis. For this, I have searched in the ROOT user guide but unfortunately I could not see any functionality there for that.

How to convert different kinematic variables from lab frame to cm frame using root?

Is there any functionality available in root for this conversion?

Thanks

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Subject: Re: how to convert kinematic variables from lab frame to cm frame in root

Posted by [Ralf Kliemt](#) on Mon, 03 Jun 2013 07:32:17 GMT

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Hello,

There are two situations:

A) If you do analysis, there is the RhoBooster class which helps transforming the particle candidates between LAB and CM.

B) You use TLorentzVector: There is the possibility to boost it with the CM momentum. (see also <http://root.cern.ch/root/html534/TLorentzVector.html>)

Cheers.

Ralf

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Subject: Re: how to convert kinematic variables from lab frame to cm frame in root

Posted by [Stefan Pflueger](#) on Mon, 03 Jun 2013 13:19:27 GMT

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Hi Ajay,

just a small remark: I also had to calculate this for lmd fitting. However my function calculates the 4 momentum transfer from the theta angle in the lab frame. You can see it here

[http://cbmroot.gsi.de//panda\\_doc/daily/html/classPndLmdDPMAngModel1D.htm](http://cbmroot.gsi.de//panda_doc/daily/html/classPndLmdDPMAngModel1D.htm)  
l#ab105732897c38a7fa0aaf679dcb2bd11

Maybe this is of some use..

Best regards,

Stefan

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Subject: Re: how to convert kinematic variables from lab frame to cm frame in root

Posted by [StefanoSpataro](#) on Mon, 03 Jun 2013 17:31:02 GMT

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This means that, if you have a collision along z axis, you can calculate the beta of the center of mass (betacm), and transform one TLV from lab to cm you have just to do:

```
tlv_lab.Boost(0., 0., betacm);
```

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Subject: Re: how to convert kinematic variables from lab frame to cm frame in root

Posted by [Ajay Kumar](#) on Tue, 25 Jun 2013 07:18:03 GMT

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Dear All,

Thanks to all of you.

I have boosted Lambda and AntiLambda from lab to cm frame using TLorentzVector.  
I have attached macro here. Please see it once,

Am I doing correct ?  
Please help me.

Thanks

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#### File Attachments

1) [run\\_labcm\\_conversion.C](#), downloaded 492 times

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Subject: Re: how to convert kinematic variables from lab frame to cm frame in root

Posted by [StefanoSpataro](#) on Tue, 25 Jun 2013 08:20:04 GMT

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No, it is not correct.

First of all, you have to calculate the betacm from the initial particles (the target proton at rest and the projectile antiproton), and not from the supposed reconstructed lambdas.

Second, if your CM is traveling at betacm, in order to have the coordinates in the CM frame

you have to boost them of -betacm.

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