Subject: Dalitz Decays of higher resonances.
Posted by Adrian Dybczak on Wed, 12 Oct 2011 16:54:15 GMT
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Dear Ingo

I tried to simulate Dalitz decay of higher resonances. I used macros prepared (mixed) by my self.
One can find it in attachment.
In this topic i propose to focus on one resonance N1520+ which is example.

After several tests i redeclared N1535 resonance in macro without using names from pluto.
This was only way to get "proper" result.
Names in macro
AddAlias("N1520+","N_star(1520)+");
Names in PLUTO
AddAlias("ND13+","N*(1520)+");
So there is no conflict.

What i wanted to check was:
1/. BR value for Dalitz Decay
2/. is dGamma/dM (Zetenyi/Wolf model) working.

Ad 1/. I drawed M_inv_pee from pp->pN1520->ppe+e- reaction

Then i drawed invariant mass of npi+ from pp->pN1520->pnpi+ reaction.

BR_NPi = 0.55 ; Clebsch_Gordan coeff. = 2/3.

so 4.048e-2/(0.55*0.66) = 0.11

now getting 5.36e-6/0.11 = 4.8e-5

What was assumed in macro as 5.0e-5

Ad 2/. dGamma/dM was only check via looking on display hile processing and various value of weight.

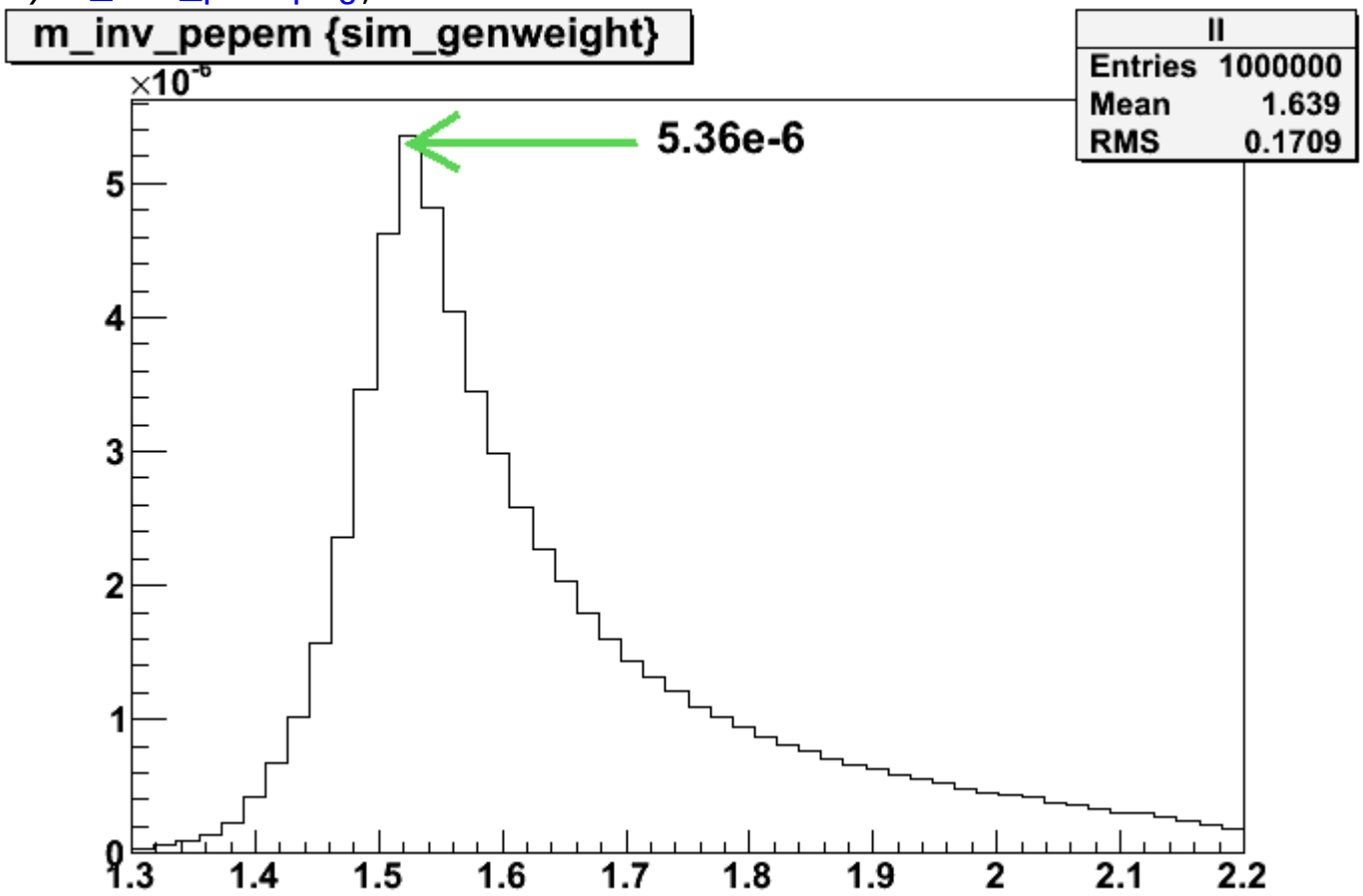
By the way below one can find distribution of weight.

It looks slightly different from D1232 weight distribution.

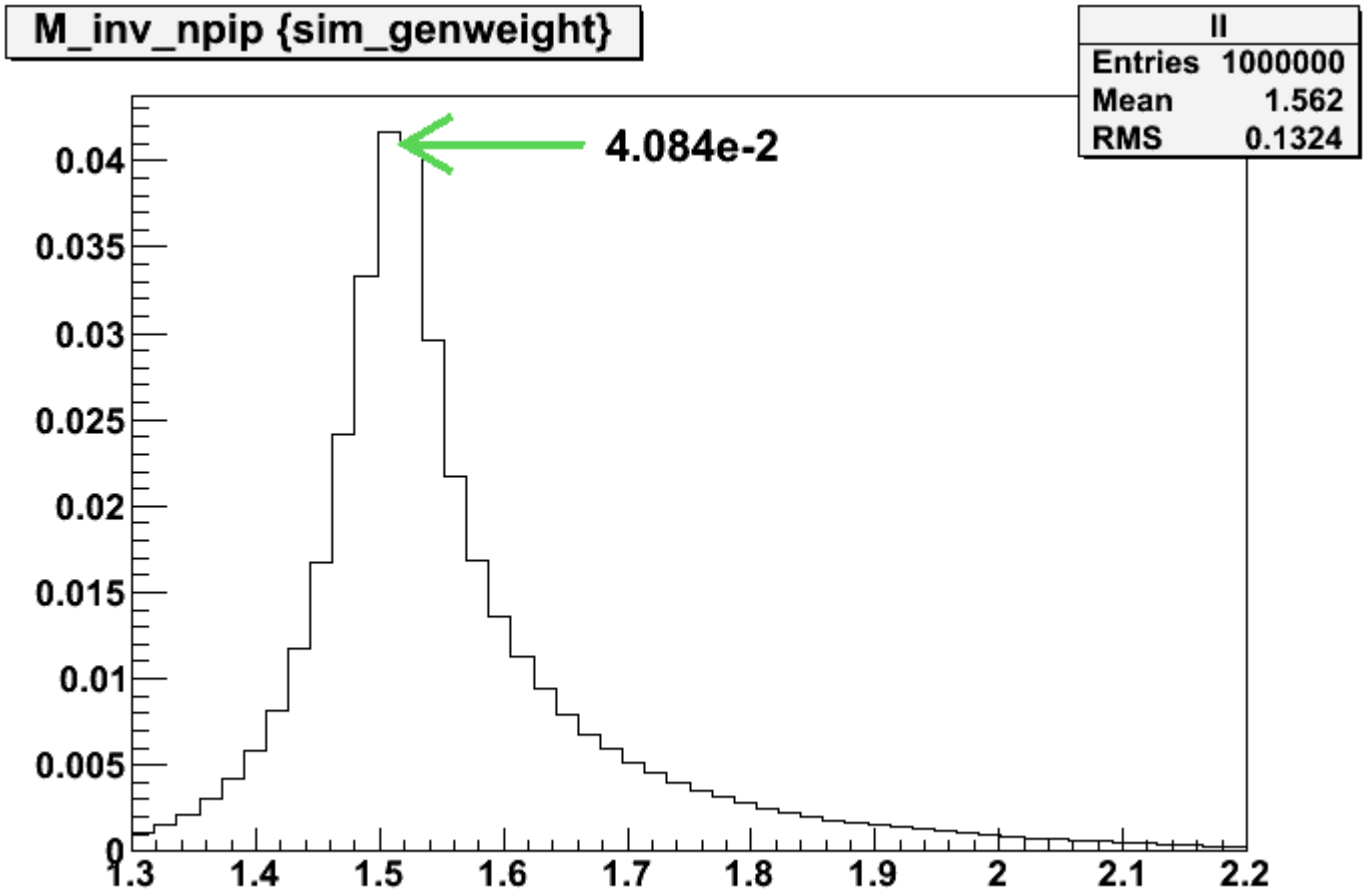
Ingo could you check this macro or provide new one which can be uses to simulate Dalitz

File Attachments

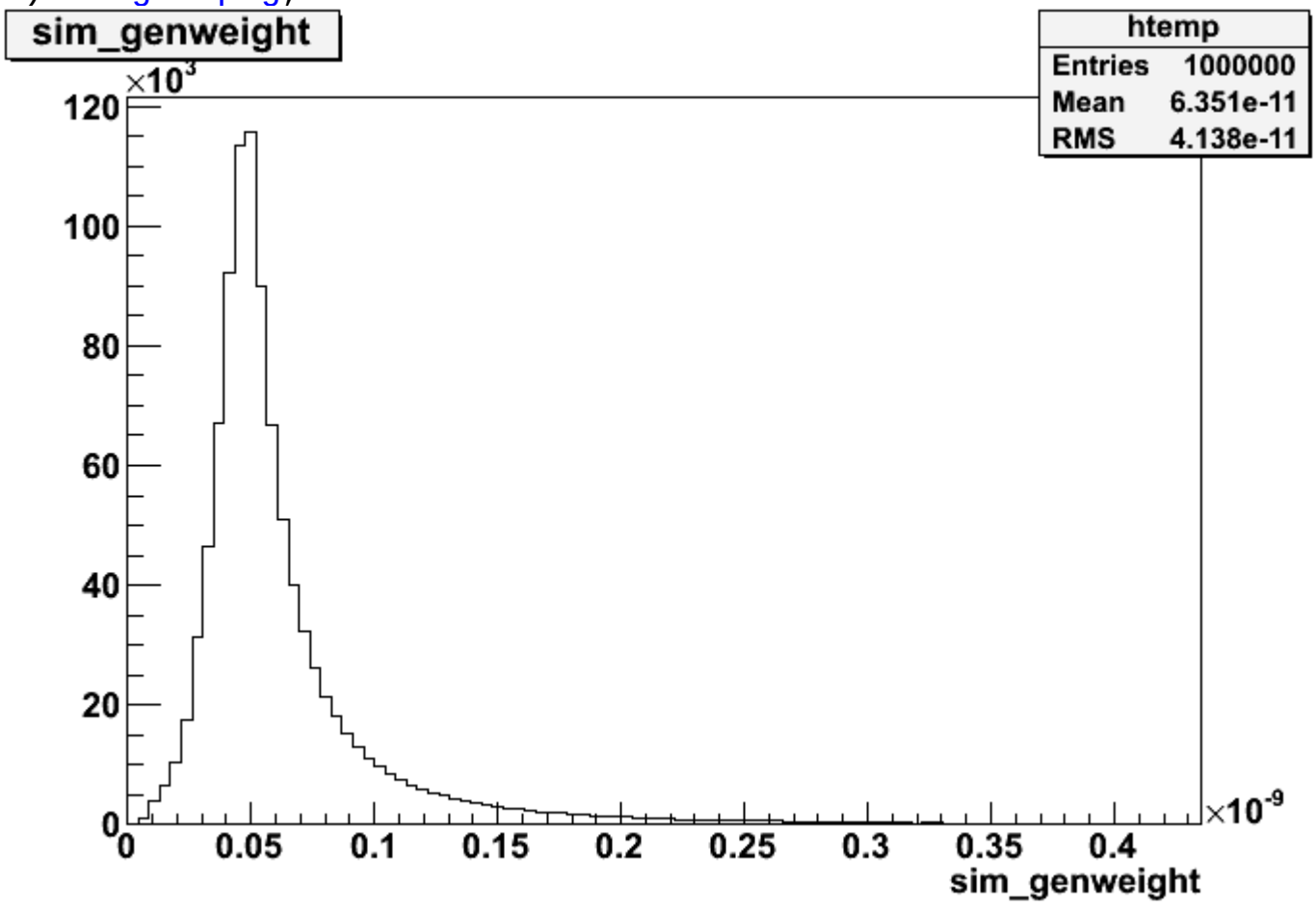
1) reaction.C, downloaded 659 times
2) m_inv_pee.png, downloaded 1510 times



3) m_inv_npip.png, downloaded 1662 times



4) weight.png, downloaded 1685 times



Subject: Re: Dalitz Decays of higher resonances.
Posted by Ingo Fröhlich on Thu, 13 Oct 2011 05:52:28 GMT
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Adrian Dybczak wrote on Wed, 12 October 2011 18:54

After several tests i redeclared N1535 resonance in macro without using names from pluto. This was only way to get "proper" result.

What was wrong with the build-in version in "dalitz_mod"? It would be important for me to know this.

Adrian Dybczak wrote on Wed, 12 October 2011 18:54
now getting 5.36e-6/0.11 = 4.8e-5
What was assumed in macro as 5.0e-5

Remember: What you declare in Pluto is the static branching ratio. What you see in the histogram is the weight directly coming from the model (basically the coupling constant), this we can see here:

my_reaction->Do("_w = _w * {N1520+_dalitz}->GetBR([N1520+]->M());");

what is done here is to fold the weight with the mass-dependent branching ratio. This was (originally) implemented to feed the Pythia rho into Pluto in order to change the shape.

Subject: Re: Dalitz Decays of higher resonances.
Posted by Adrian Dybczak on Thu, 13 Oct 2011 14:26:29 GMT
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Hi Ingo

In the same way as previosly i made several test.
I used same macro as you send me to simulate D+ but this time ND13+ (N*1520) was simulated (macro in attachment).
Here are results:

Mass of Delta

Mass of pee

Ratio means BR

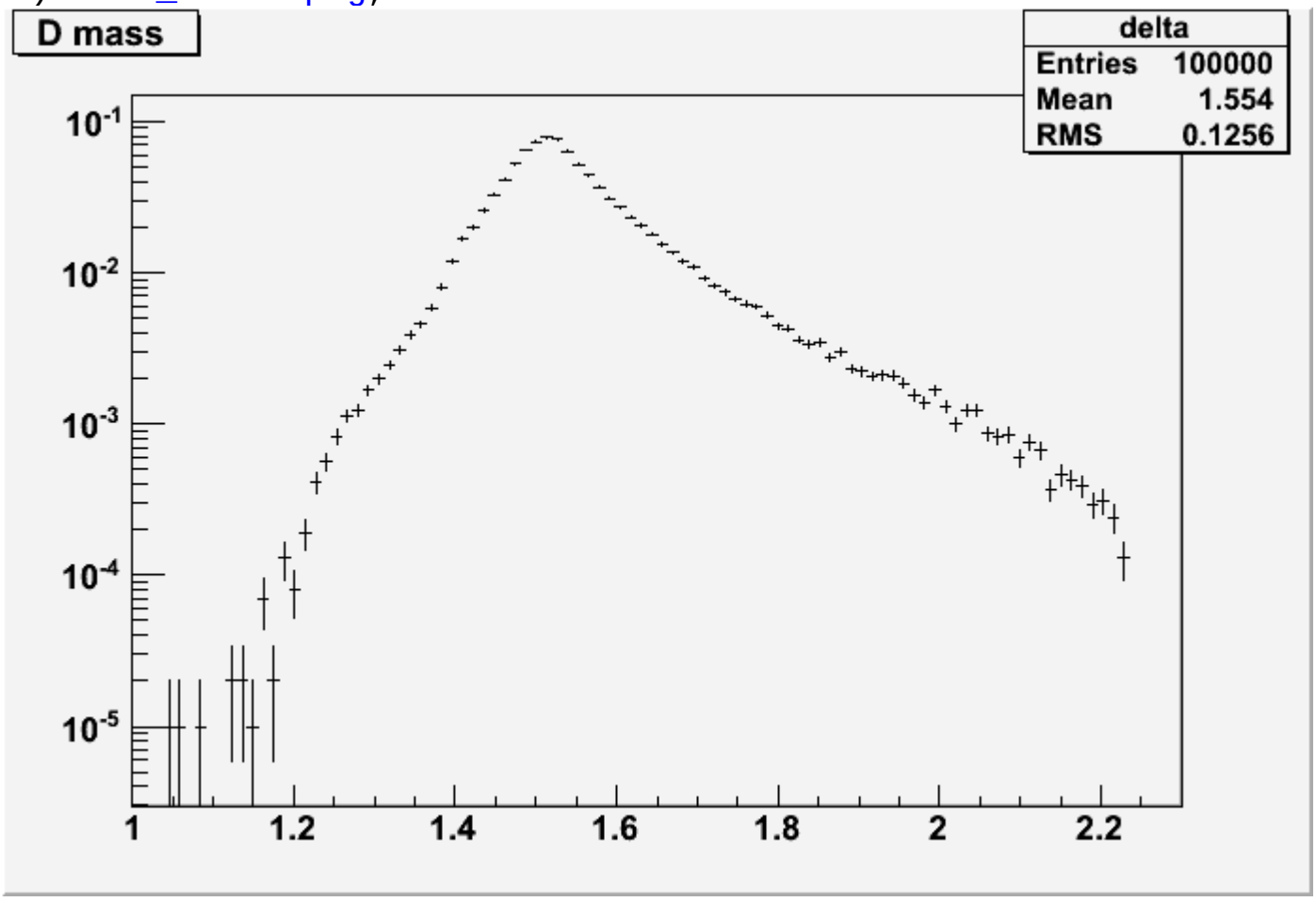
One can see that:
- shapes are ok
- BR ratio in pole is same as expected (0.0051/137=3.7e-5)

Commend [ND13+_dalitz] dgdm from Zetenyi/Wolf {/} is displayed while processing but weight is constant

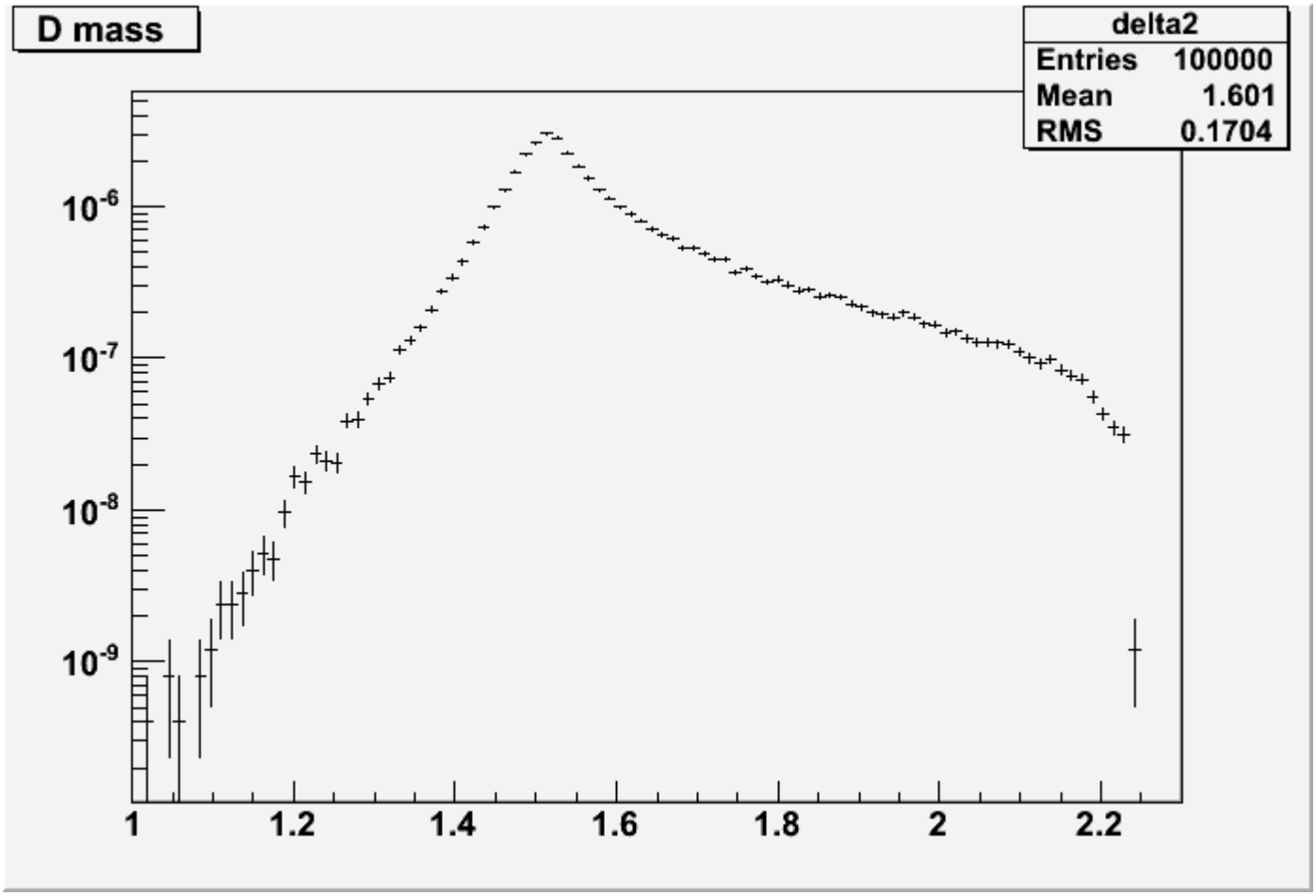
Does it means that dGamma/dM working or not?

File Attachments

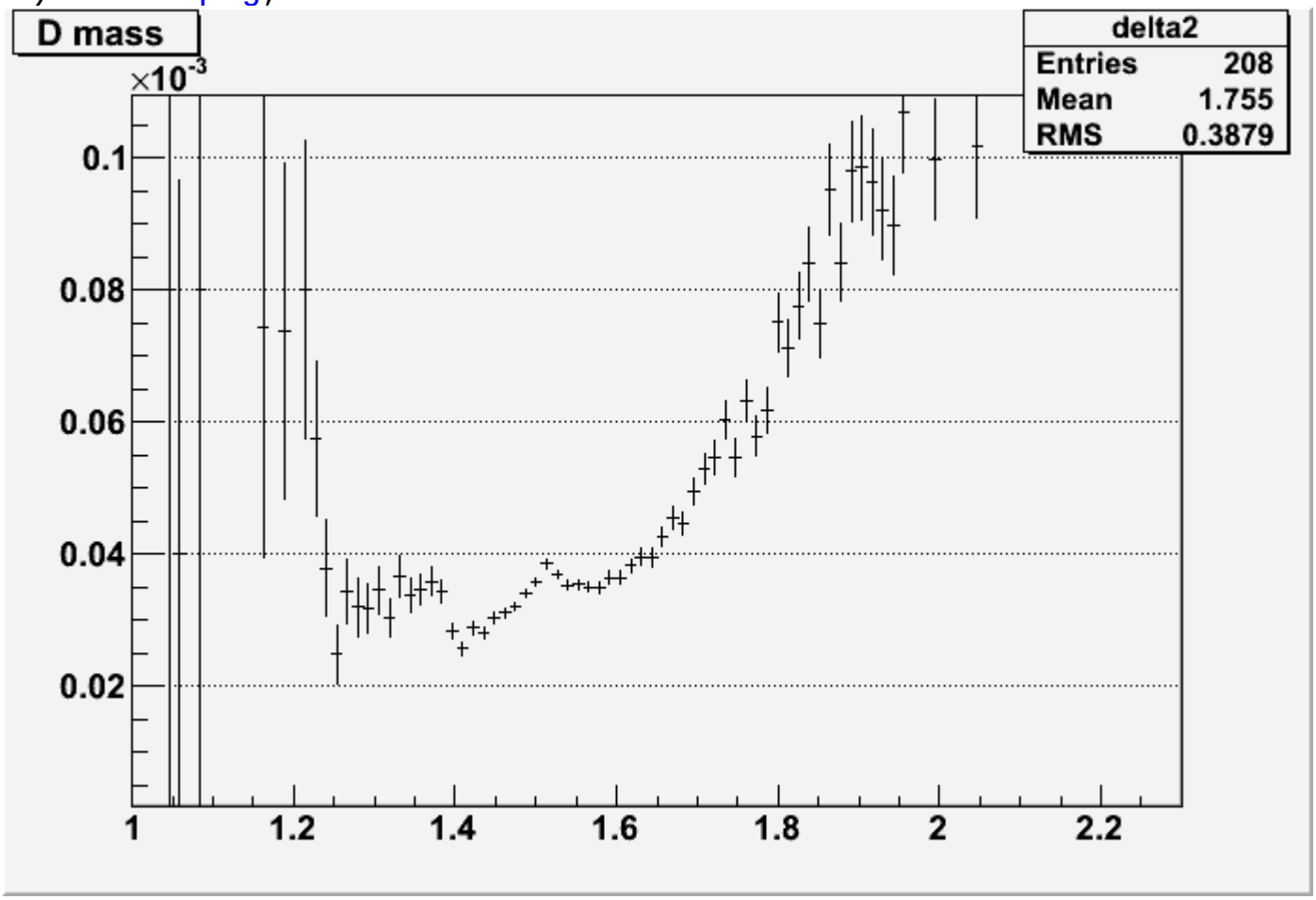
1) mass_Delta.png, downloaded 1218 times



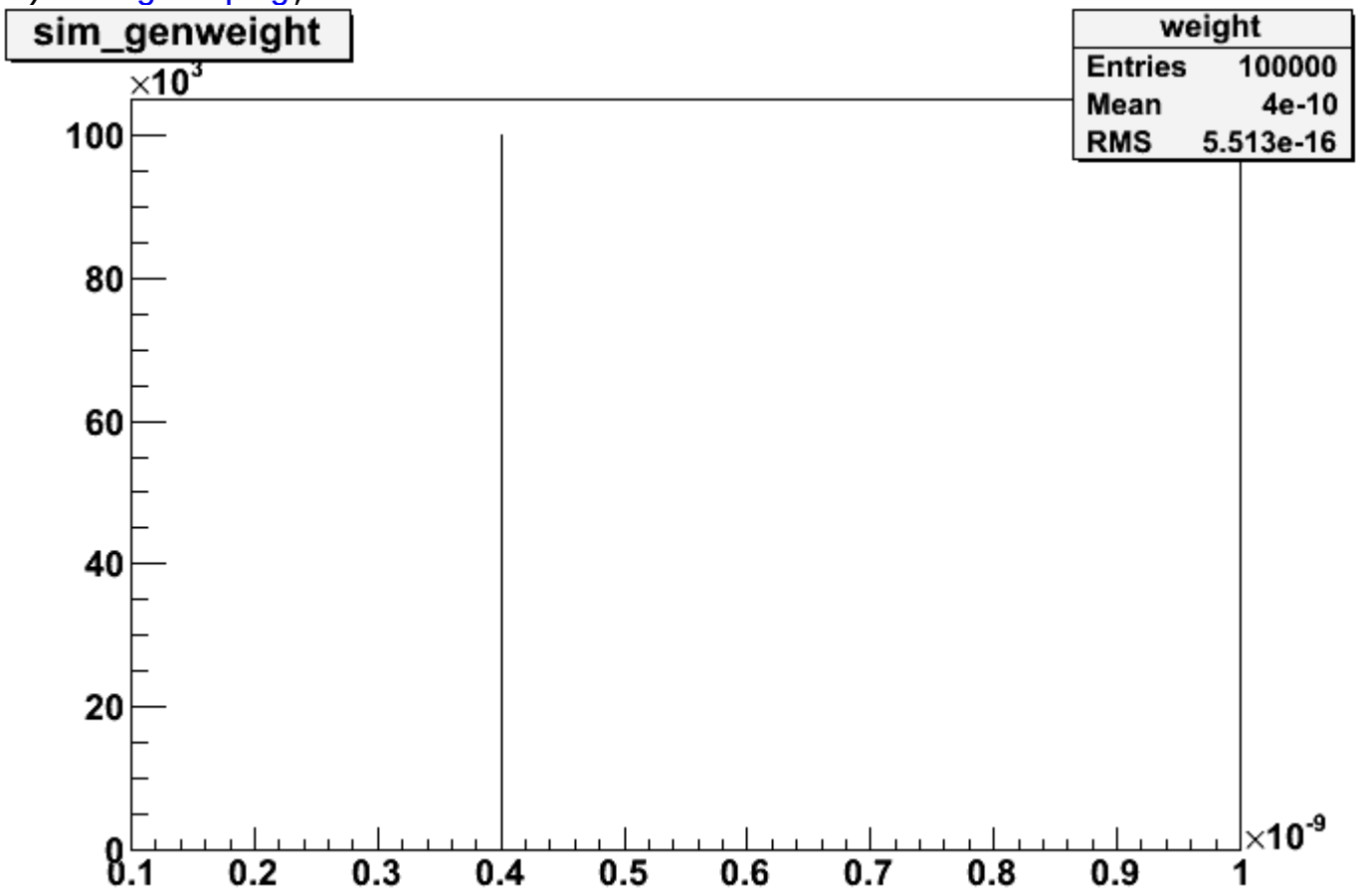
2) mass_pee.png, downloaded 1196 times



3) ratio.png, downloaded 1085 times



4) weight.png, downloaded 1190 times



5) test_elementary_adrian.C, downloaded 454 times

Subject: Re: Dalitz Decays of higher resonances.
Posted by Ingo Fröhlich on Thu, 13 Oct 2011 15:36:13 GMT
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You are absolutely right, there was no flat electron generator enabled. The reason is that the new decays were not recognized as Dalitz-Decays (hardcoded in PData.h).

I did the following changes in PData.h (IsDalitz):

```
    int d = makeStaticData()->GetParticleBaryon(id) &&  // Delta0 Dalitz decay?
  ((makeStaticData()->IsParticle(i1,"dilepton") &&
    makeStaticData()->GetParticleBaryon(i2)) ||
   (makeStaticData()->GetParticleBaryon(i1) &&
    makeStaticData()->IsParticle(i2,"dilepton")));

    return (pseudo&&eeg) || (pseudo&&mumug) ||
  (vector&&eepi) || (vector&&mumupi)
  || D0 || Dp || pn || NS0 || NSp || d;
```

now it should print:
Info in <PDalitzModPlugin::ExecCommand>: Model <NS11+_dalitz> uses dGamma/dM for the

branching ratio
Info in <PDalitzModPlugin::ExecCommand>: Model <NP110_dalitz> uses dGamma/dM for the branching ratio
Info in <PDalitzModPlugin::ExecCommand>: Model <ND130_dalitz> uses dGamma/dM for the branching ratio
Info in <PDalitzModPlugin::ExecCommand>: Model <NS110_dalitz> uses dGamma/dM for the branching ratio

and:
[ND13+_generator_p_dilepton] Dilepton generator {/generator}

Subject: Re: Dalitz Decays of higher resonances.
Posted by Adrian Dybczak on Thu, 13 Oct 2011 19:24:44 GMT
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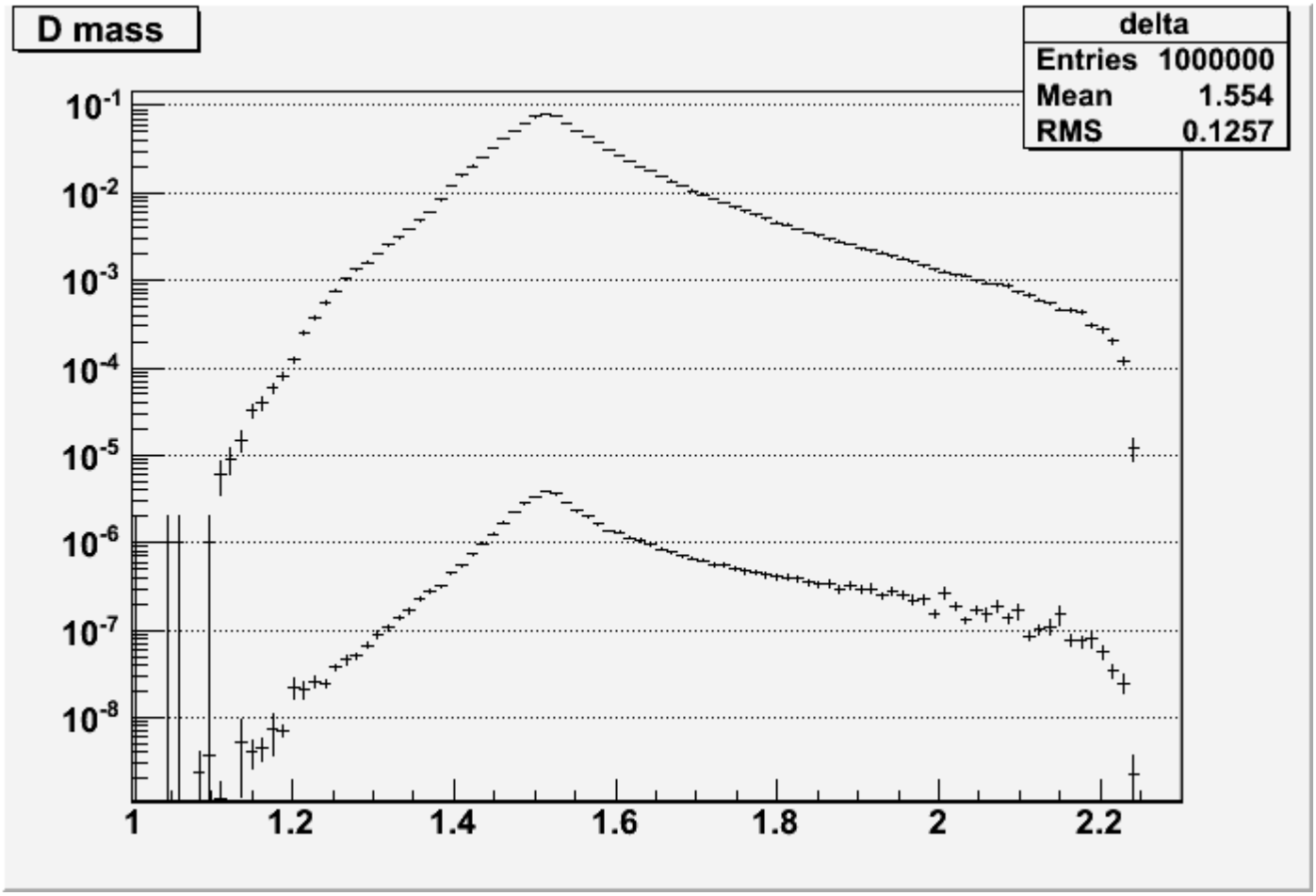
So i apply changes and it works!

Please see pictures below.

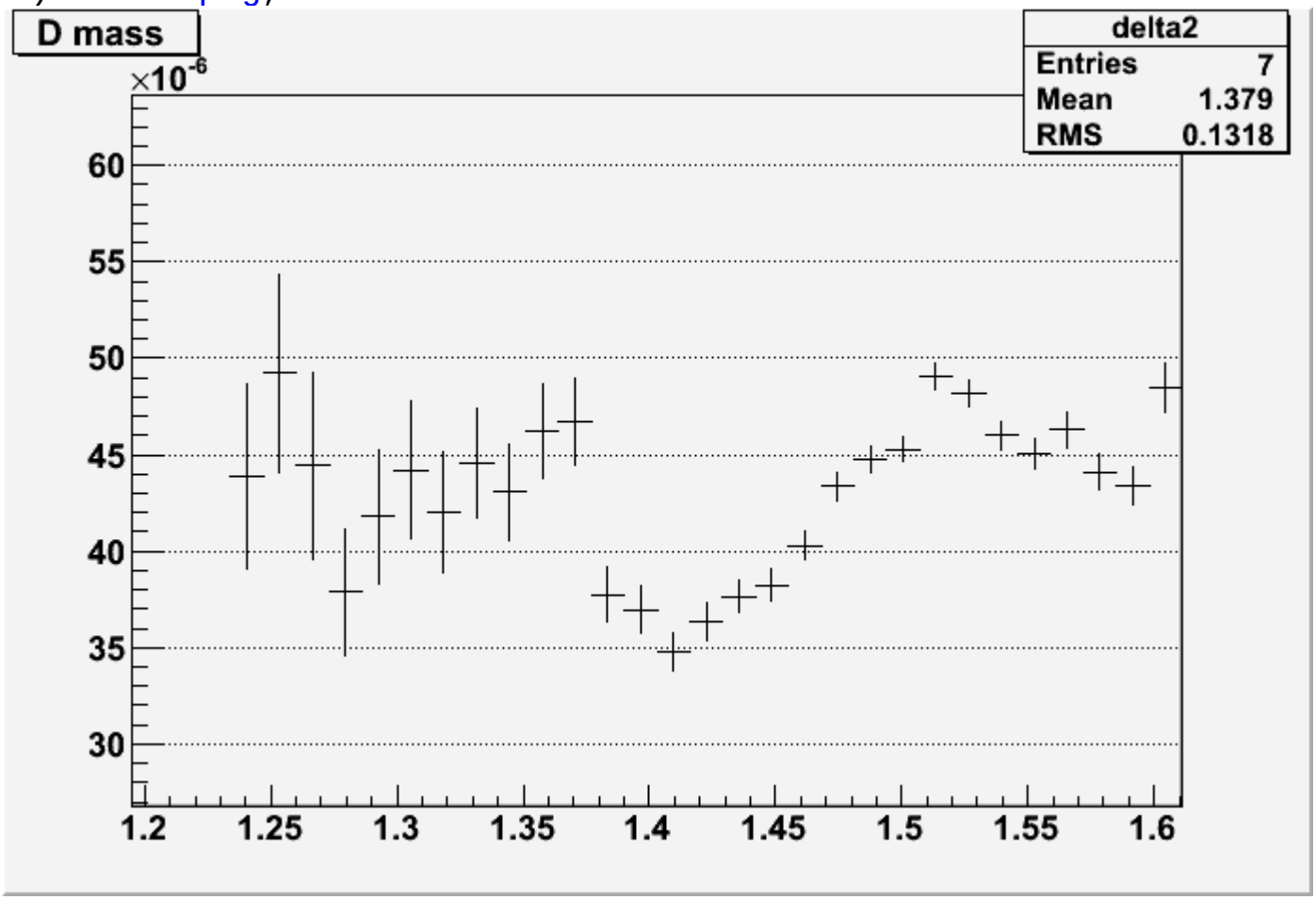
All comments were displayed hile processing.
Weight is changing (see below).

Now BR is 5e-5 in pole. Shouldn`t be 3.7-5 as before?

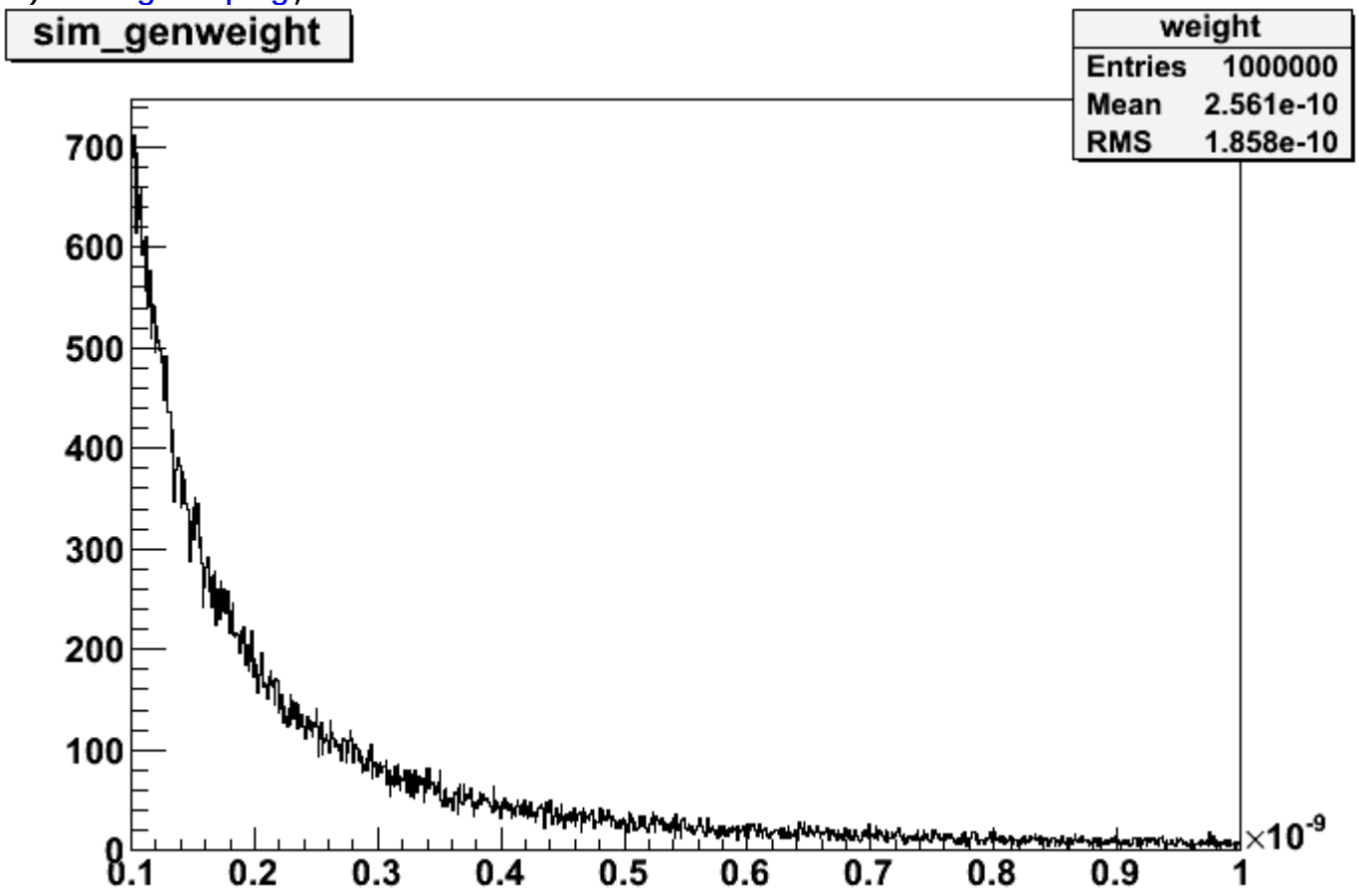
File Attachments
1) mass_comparison.png, downloaded 1189 times



2) ratio.png, downloaded 1125 times



3) weight.png, downloaded 1124 times



Subject: Re: Dalitz Decays of higher resonances.
Posted by Ingo Fröhlich on Thu, 13 Oct 2011 20:50:48 GMT
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Adrian Dybczak wrote on Thu, 13 October 2011 21:24
Now BR is 5e-5 in pole. Shouldn`t be 3.7-5 as before?

Hard to say. It directly comes from the model (i.e. the coupling constant). Maybe we have to check it against a calculation using the equations from the paper

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