Subject: [CLOSED] Delta from Krivoruchenko
Posted by Ingo Fröhlich on Fri, 07 Oct 2011 08:47:52 GMT
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Dear all,

please update to v5.38.2. In the previous version, the Krivoruchenko model was not enabled by using the following command:

makeDistributionManager()->Exec("dalitz_mod: krivoruchenko");

It is very important to check the output of the reaction, it should print:

[D+_krivoruchenko] dgdm from Krivoruchenko {/}

some more word to the calculation of branching ratios. By default, Pluto does not calculate the branching ratio, but takes as a weight 1/N_ev * BR, where BR is the static branching ratio. This leads of course to incorrect results at the pole, if the branching ratio shows a large mass-dependency.

The only way to let Pluto calculate the branching ratio, is the "Monte-Carlo-Integration method". In this case one has to use a flat dilepton mass generator:

makeDistributionManager()->Exec("dalitz_mod: static_br_thresh=0.100 ; flat_generator");

By using this, the another model is added:

[D+_generator_p_dilepton] Dilepton generator {/generator}

I attached below a macro which uses this method.

Toggle Spoiler

```
   makeDistributionManager()->Exec("elementary");
   makeDistributionManager()->Exec("dalitz_mod: krivoruchenko");
   makeDistributionManager()->Exec("dalitz_mod: static_br_thresh=0.100 ; flat_generator");

   PReaction *my_reaction =
new PReaction("3.5","p","p","p D+",NULL,1,0,0,0);

   TH1F * pp_sum =
new TH1F ("pp_sum","pp DiLepton mass (coherent sum)",100,0.,0.6);
   pp_sum->Sumw2();
   TH1F * delta =
new TH1F ("delta","D mass ",100,0.9,1.6);
   delta->Sumw2();


   my_reaction->Do(pp_sum,"_x=[dilepton]->M()");
   my_reaction->Do(delta,"_x=[D+]->M()");
   my_reaction->Print();
```

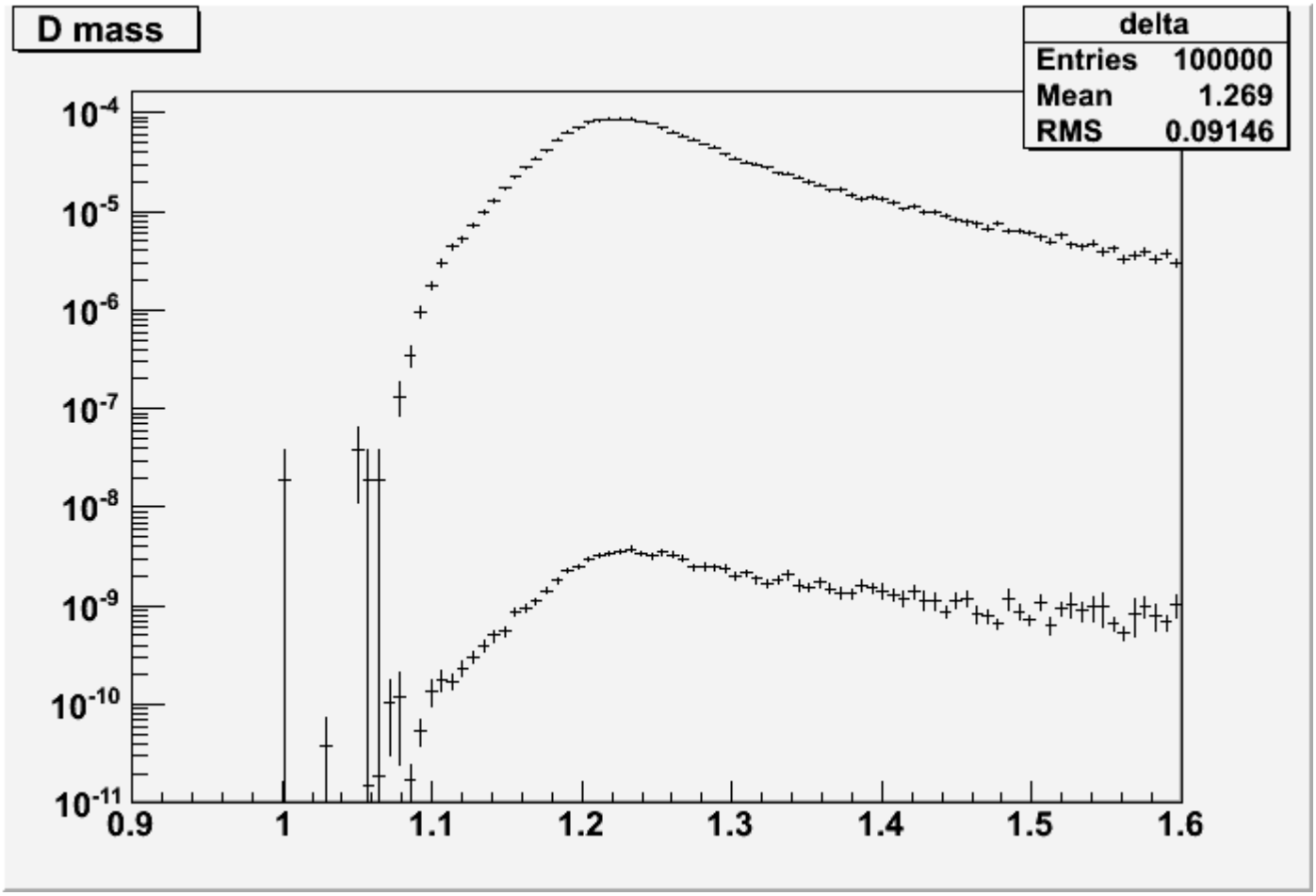
```
   my_reaction->Preheating(100);
   my_reaction->Loop(100000);

   PReaction *my_reaction2 =
new PReaction("3.5","p","p","p D+ [dilepton p]",NULL,1,0,0,0);

   TH1F * pp_sum2 =
new TH1F ("pp_sum2","pp DiLepton mass (coherent sum)",100,0.,0.6);
   pp_sum2->Sumw2();
   TH1F * delta2 =
new TH1F ("delta2","D mass ",100,0.9,1.6);
   delta2->Sumw2();

   my_reaction2->Do(pp_sum2,"_x=[dilepton]->M()");
   my_reaction2->Do(delta2,"_x=[D+]->M()");
   my_reaction2->Print();

   my_reaction2->Preheating(100);
   my_reaction2->Loop(100000);

   //    delta2->Divide(delta);
   delta->Draw("");
   delta2->Draw("same");[/QUOTE]
```

The result is shown below:

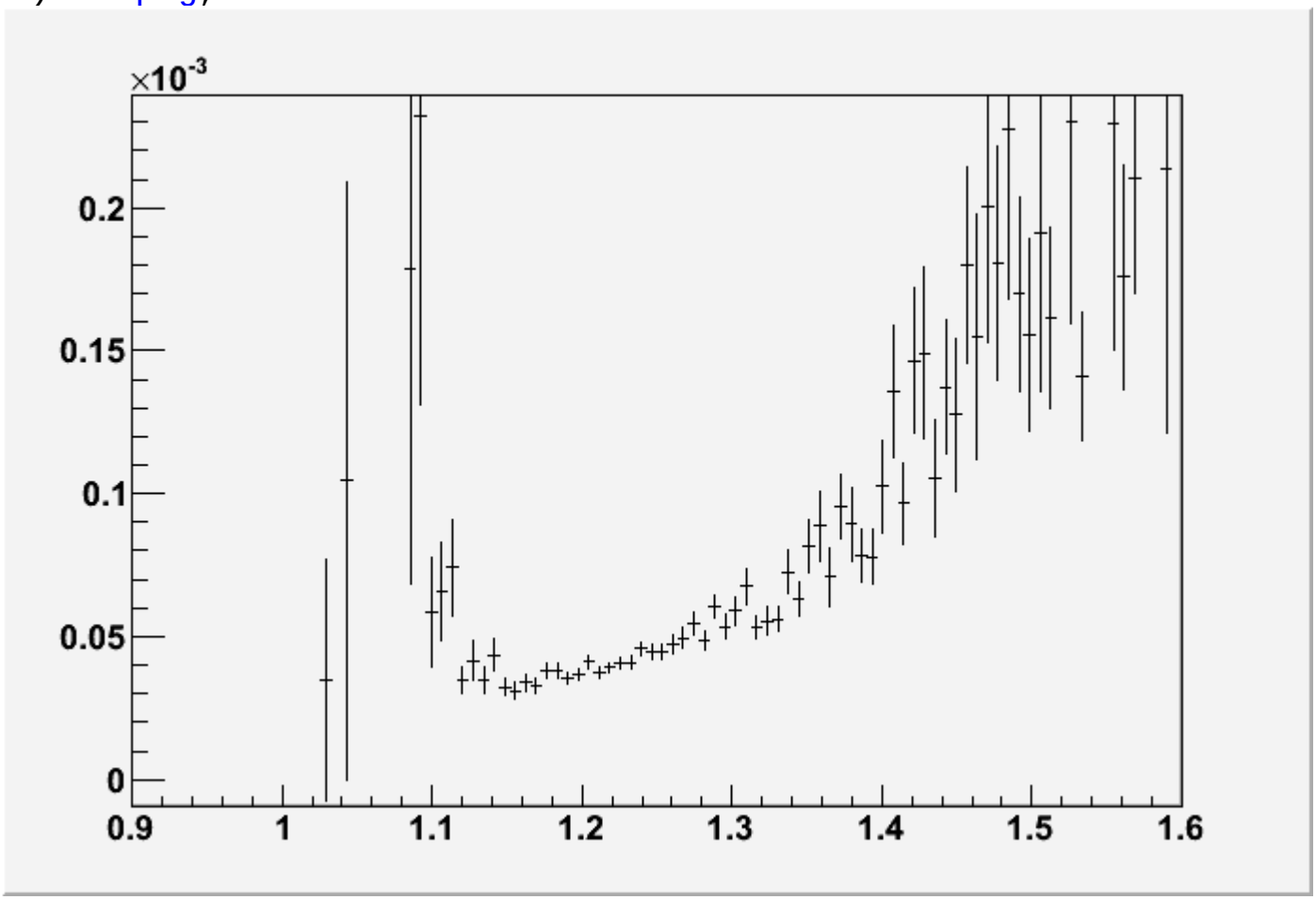
and this is the branching ratio which I obtain:

File Attachments

1) kriv.png, downloaded 1571 times



2) c1.png, downloaded 1609 times



Subject: Re: Delta from Krivoruchenko
Posted by Adrian Dybczak on Tue, 11 Oct 2011 11:51:52 GMT
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As we can see BR ratio in the pole is OK.
Also dGamma/dM is working fine.

I put distributions of Delta mass drawed for 1mln generated events directly from this macro (not in Log Scale).

This looks nice.

But for mas of (proton e+ e-) one can see

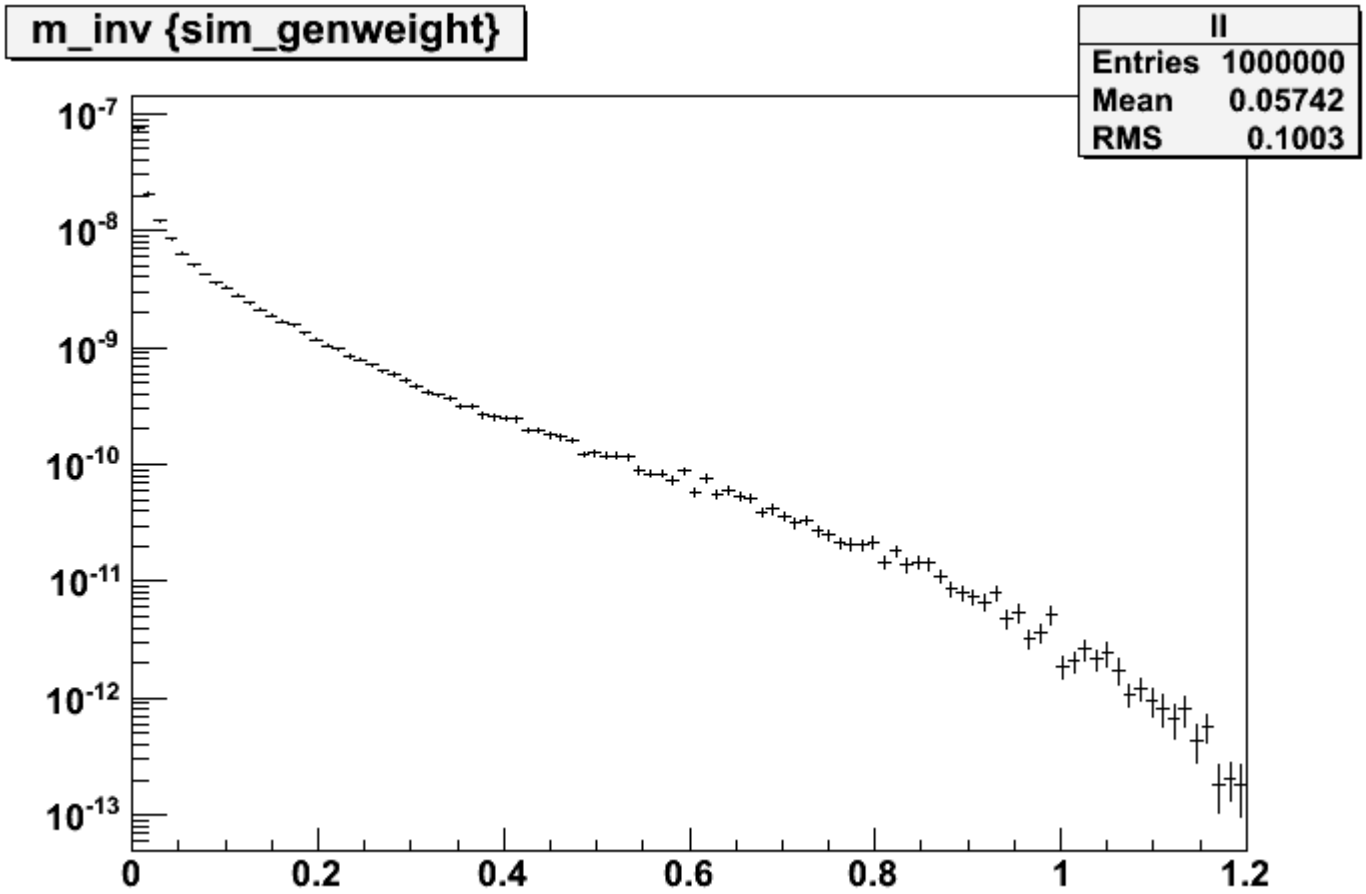
Question is: How large should be statistic to get smooth shape of Dalta tail? Because 1 mln is not enough as we can see.

By the way i thought that main goal to use flat gen was to make tail smoother. Do we have reversed result?

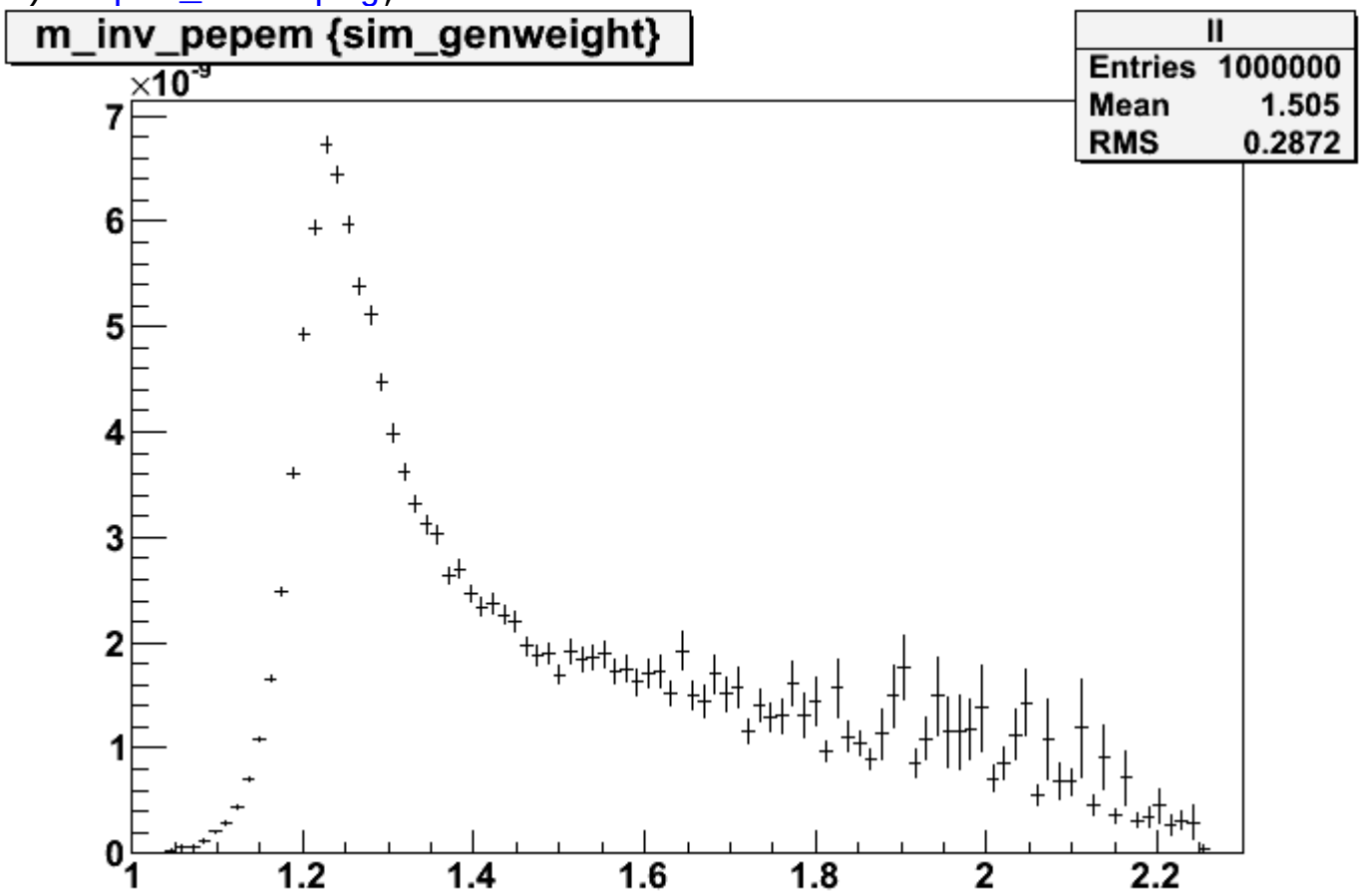
e+e- invariant mass looks quite smoothly.

File Attachments

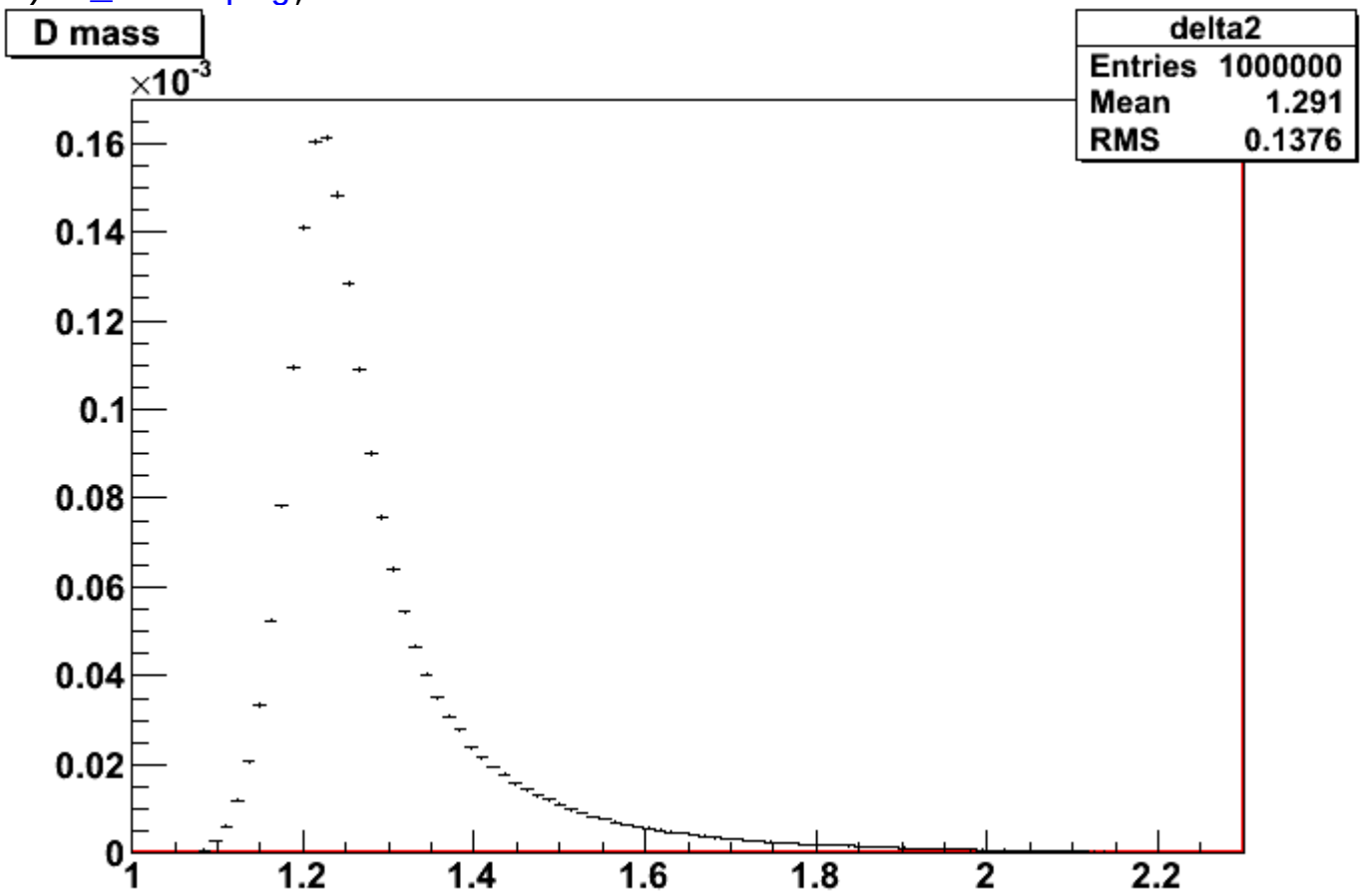
1) EpEm_mass.png, downloaded 1200 times



2) PEpEm_mass.png, downloaded 1159 times



3) D_mass.png, downloaded 1133 times



Subject: Re: Delta from Krivoruchenko
Posted by Ingo Fröhlich on Tue, 11 Oct 2011 16:28:42 GMT
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Dear Adrian,

thank you for this observation. I understand now much clearer what you mean when talking about fluctuations.

I think they source of the fluctuation is as follows: the pure Delta does not have the large tails. When you use the intrinsic calculation of the branching ratio (this is what we do when you want to have the correct b.r. at pole), I have to disable the explicit mass-dependent partial decay width, i.e. the tail at large masses is also disabled.

This means we strongly enhance the remaining tails. You can see this also in my plot, where I have plotted the mass-dependent branching ratio. So it is not a matter of statistics.

The only way to avoid this is to go back to the "classical" method (no flat di-electron generator). But in this case, as you know, the weight is fixed to 1/N_ev * "static branching ratio". This means you have to correct the old histogram such that it overlays with the new one, than you have a correction factor.

If I think more about it, there could be one solution, this is a "box-like" Delta generator together with the weight of the shape. But I never tested this and it is one additional source of complication.

Subject: Re: Delta from Krivoruchenko
Posted by Adrian Dybczak on Wed, 12 Oct 2011 16:46:37 GMT
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Hi Ingo

I have discussed with Piotr and conclusion is that fluctuations are acceptable if correction of this means lot of work. One can plot M_inv_pepem with smaller number of bins. This is not problem.

Subject: Re: Delta from Krivoruchenko
Posted by Piotr Salabura on Wed, 19 Oct 2011 08:54:27 GMT
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Here I post document written by Beatrice which summarize differences in descriptions of Delta Dalitz decays by various models which exist on the market. In _Pluto we use Krivoruchenko/Martemayenov which is eq. to Zetenyi/Wolf (if use constant form-factors)

Piotr

File Attachments
1) remarks_Delta.pdf, downloaded 640 times

Subject: Re: Delta from Krivoruchenko
Posted by Malgorzata Gumberidze on Thu, 20 Oct 2011 07:17:40 GMT
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I have made similar studies for the pp@2.2.

For the pluto cocktail which is included into the
draft of the publication we were using pluto version v5.36
and PDecayManager. In the plot below you can see mass
dependent branching ratio for the Delta+ in channel
pp->pD+.

the color meaning is following:

Pluto v5_36 with DecayManager, not working Krivoruchenko, no flat generator

PLEASE notice that there is mistake in the label in plot, it is v5.36 and not v5.26

Pluto v5_38.2 with PReaction and all flags switch on:

makeDistributionManager()->Exec("elementary");
makeDistributionManager()->Exec("dalitz_mod: krivoruchenko");
makeDistributionManager()->Exec("dalitz_mod:static_br_thresh=0.100 ; flat_generator");

In case of the BLACK normalization comes for free using weights. RED curve is normalize in a way that at pole this ration is 4.15e-5.

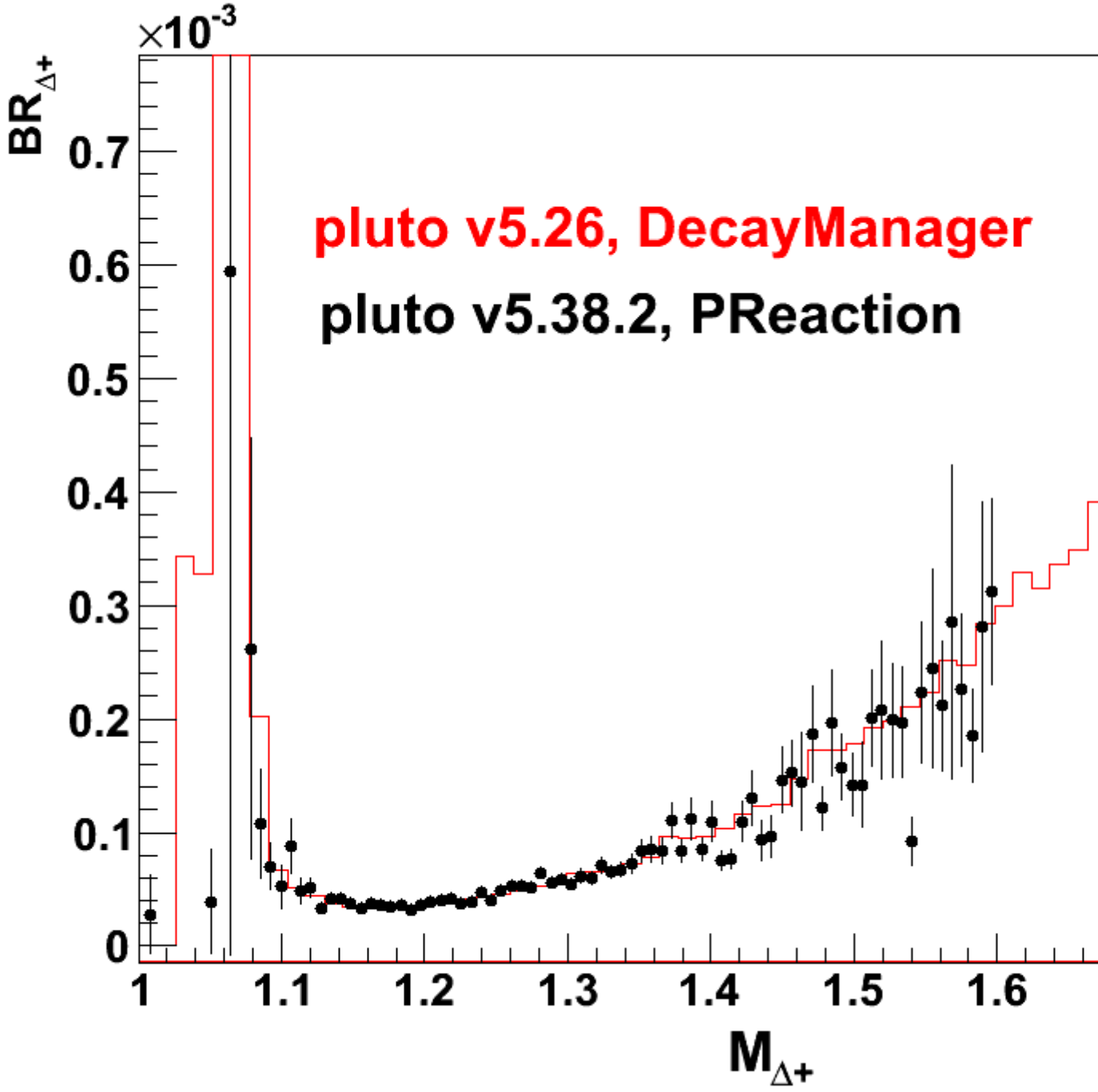
mass dependance of the BR in both calculations are very similar.
That means if the DecayManager spectra are scaled such that average BR is 5.9e-5 (as obtain with the recommnded procedure from the Forum) then the resulting Delta contribution to the dilepton mass spectrum should be fine.

same investigation for the rho0 will follow

gosia

File Attachments

1) BD_massDp_old_newPluto.gif, downloaded 1107 times



Subject: rho BR
Posted by Malgorzata Gumberidze on Thu, 20 Oct 2011 08:27:49 GMT
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Please find here now plot which is showing mass dependent BR for the rho0.

In similar way as before:

For the pluto cocktail which is included into the
draft of the publication we were using pluto version v5.37
and PDecayManager. This version is different then for Delta
but it is due to some futures in case of rho0 which were in previous version, and were not correct.

In the plot below you can see mass
dependent branching ratio for the Delta+ in channel
pp->pprho0.

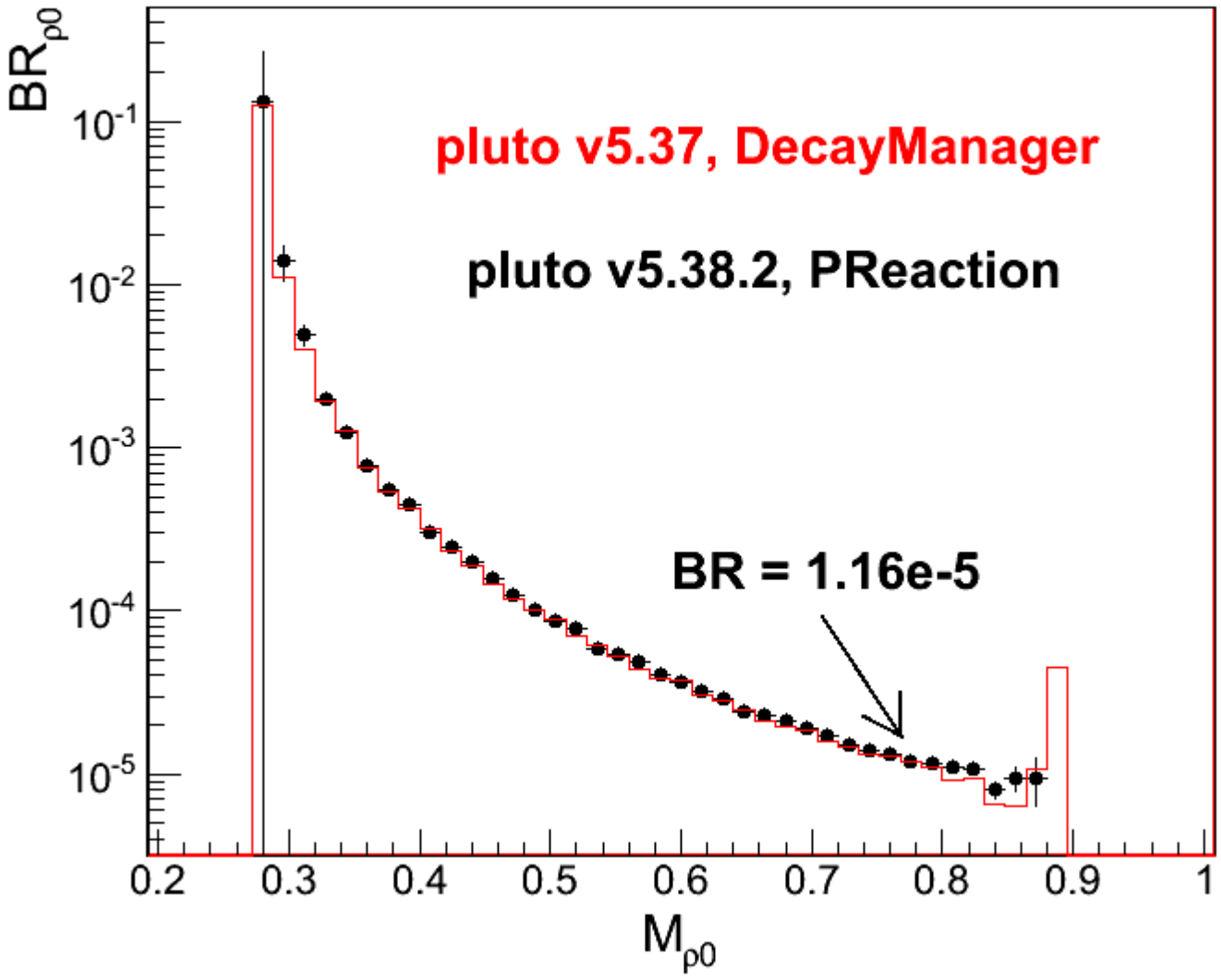
In case of the BLACK normalization comes for free using weights. RED curve is normalize in a way that at pole BR is the same like for BLACK one.

Please notice also that in this case the BR at pole is not
correct, but maybe i do something wrong, so please ingo have
a look into my macro.

gosia

File Attachments

1) plot_rho.gif, downloaded 1126 times



2) macro_ingo_rho.C, downloaded 435 times

Subject: Re: Delta from Krivoruchenko
Posted by Tetyana Galatyuk on Mon, 24 Oct 2011 09:22:03 GMT
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Dear all,

to complete the story, I have prepared
few plots for p+p at Ekin=1.25 GeV.

Figure bellow shows the mass dependent
branching ratio of Delta estimated by dividing
pp->pDelta+->pppi0 by pp->pDelta+->ppe+e-

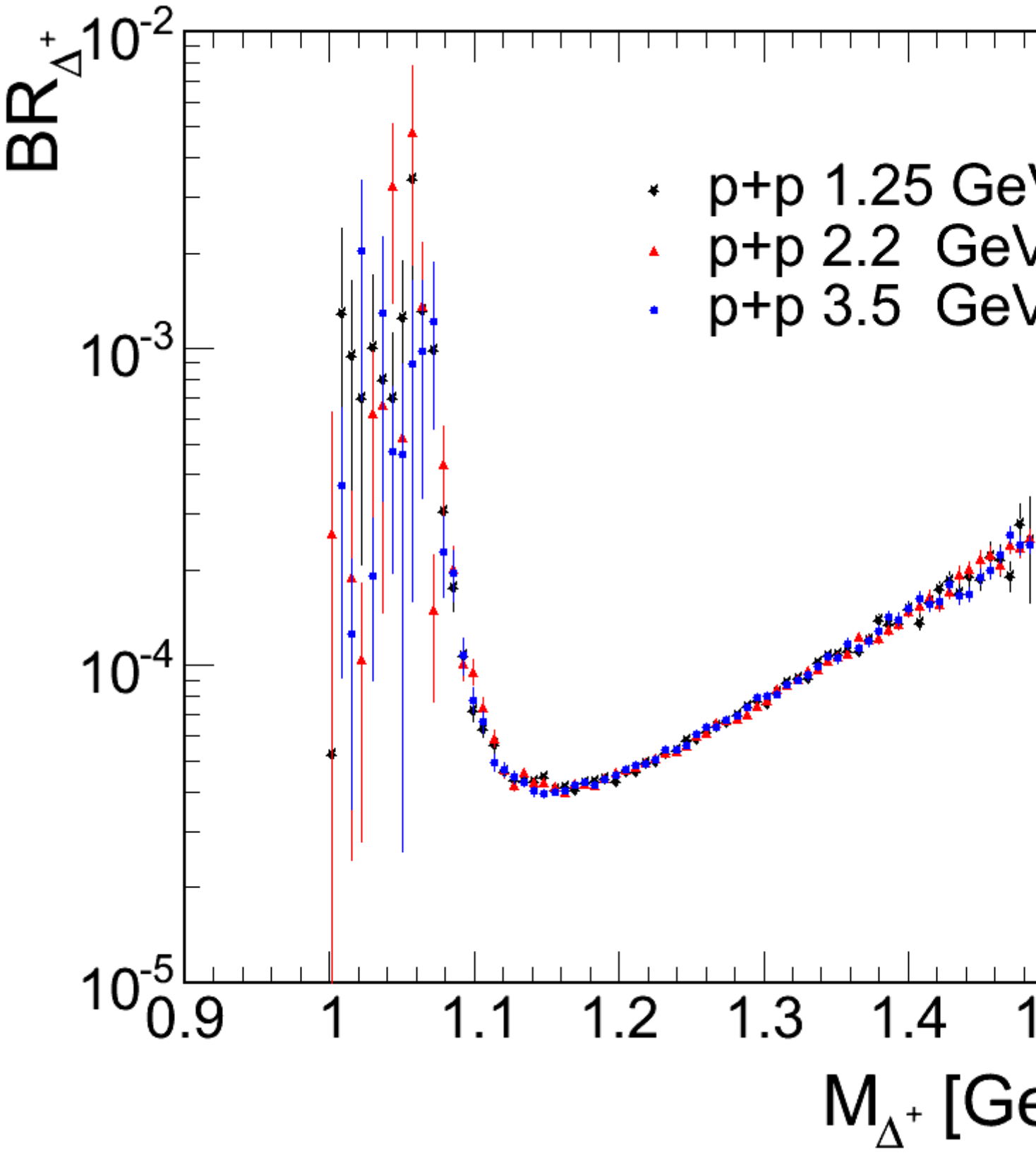
The next point which was checked concerns the following issue:
Ingo wrote:
>please update to v5.38.2. In the previous version,
>the Krivoruchenko model was not enabled by using
>the following command:
>makeDistributionManager()->Exec("dalitz_mod: krivoruchenko");

Bellow you can find a figure which shows the
Delta+ mass distribution in channel pp->pD+->ppe+e-
for two versions of Pluto. Indeed, the Krivoruchenko
model was not enable in the Pluto versions < v5.38.2!

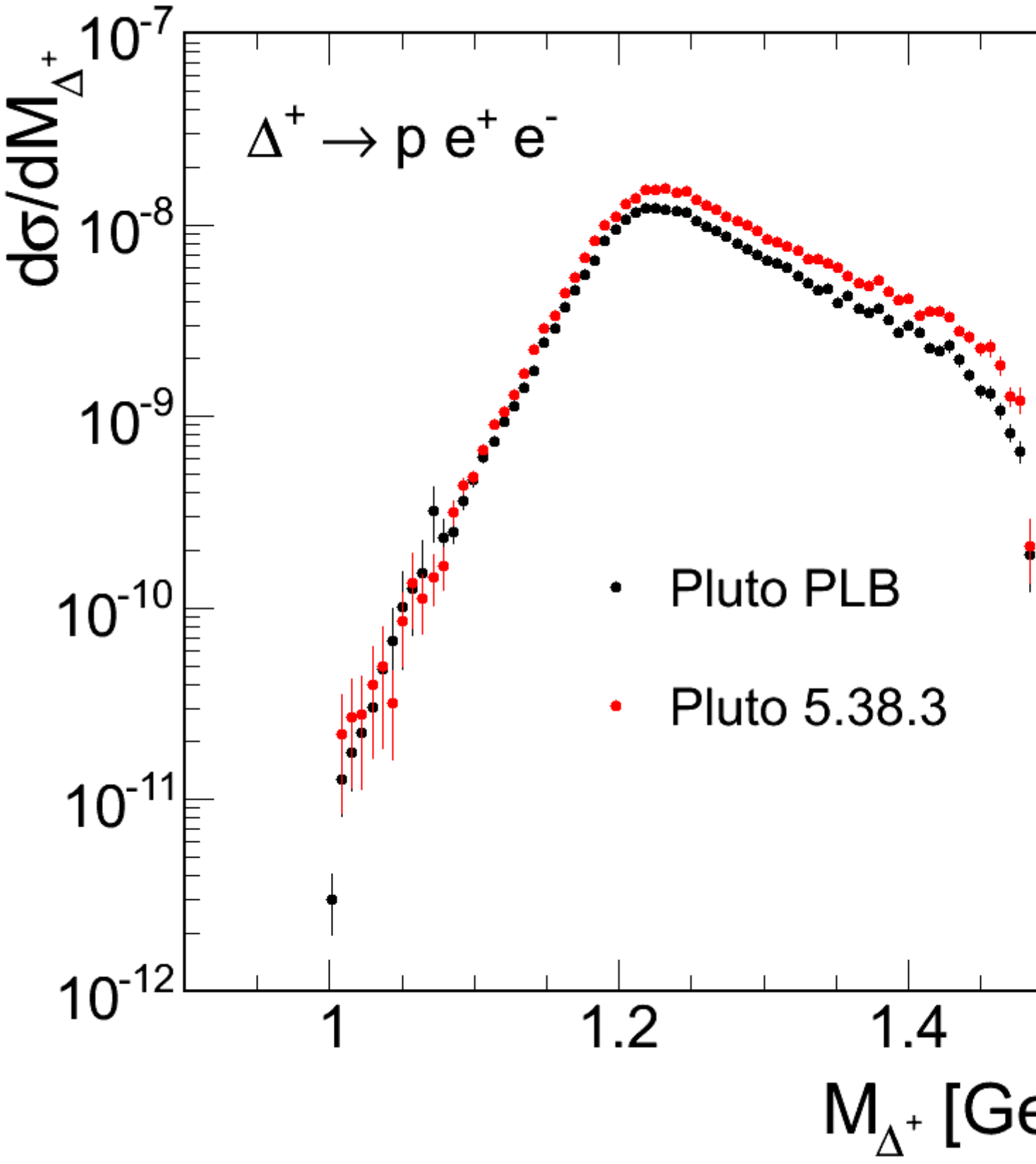
Finally, you can see the influence on invariant
e+e- mass spectrum:

File Attachments

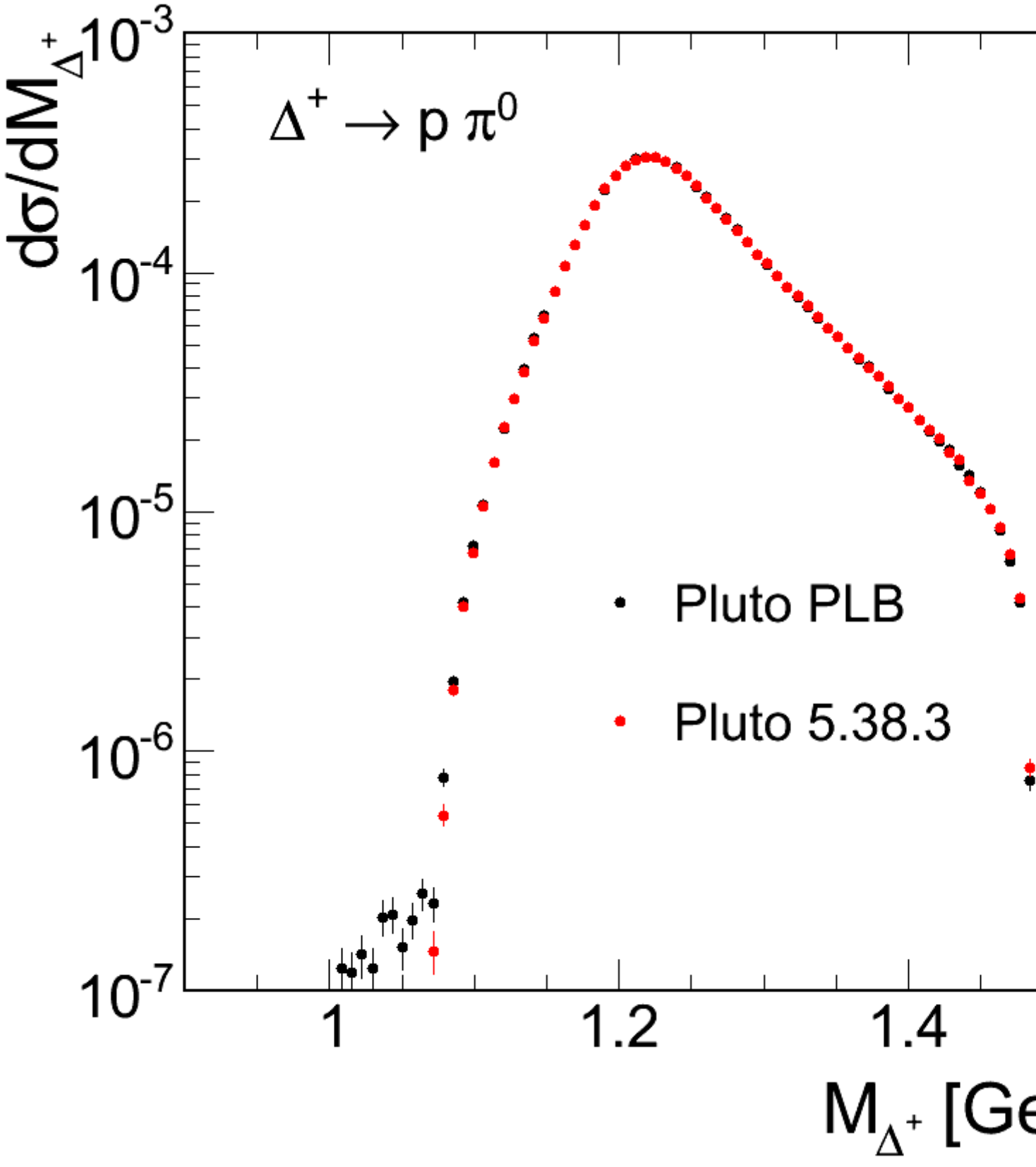
1) BR_DeltaPlus_pp125_pp22_pp35.gif, downloaded 1131 times



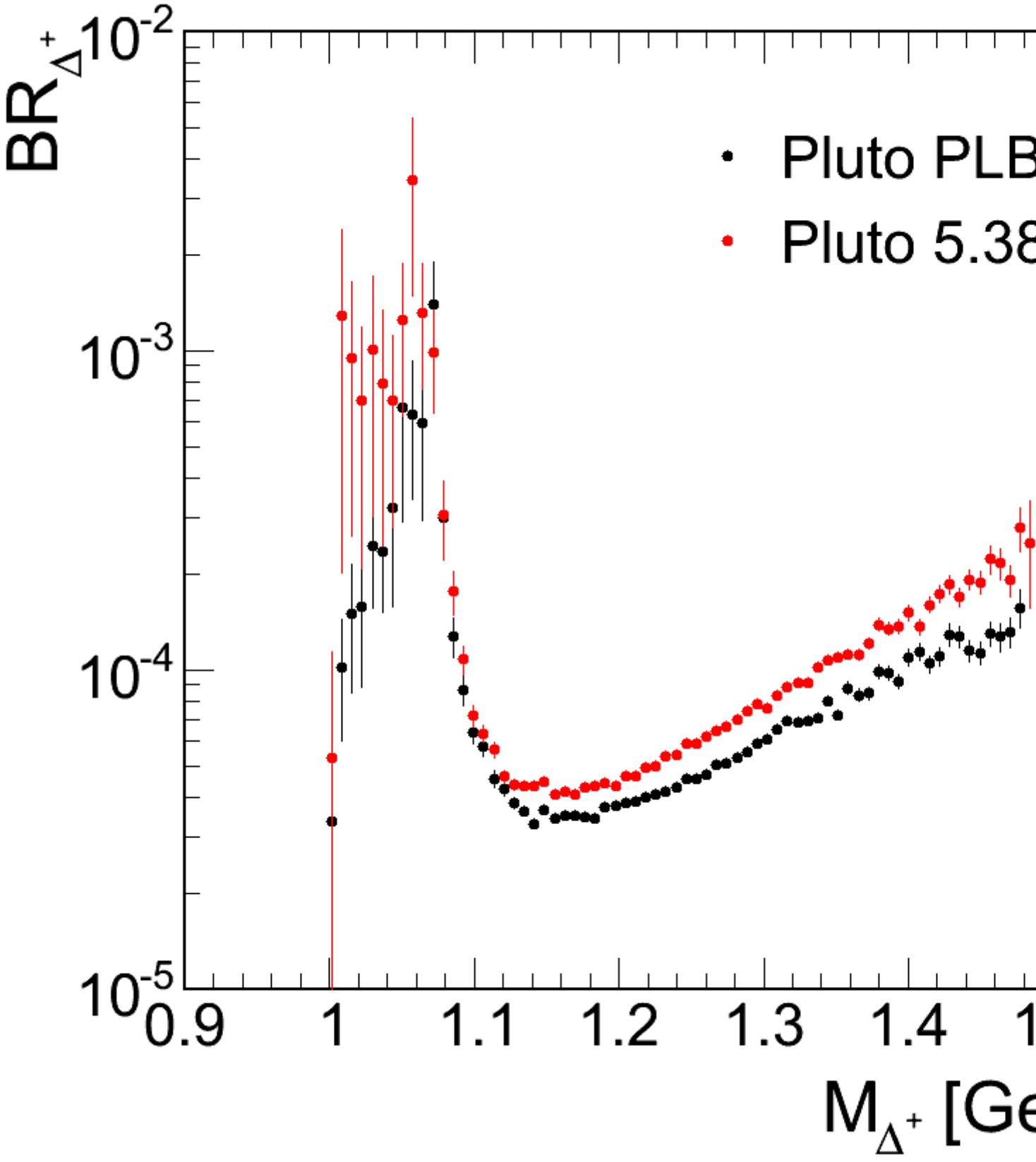
2) Delta_ProtonEpEm_pp125.gif, downloaded 1107 times



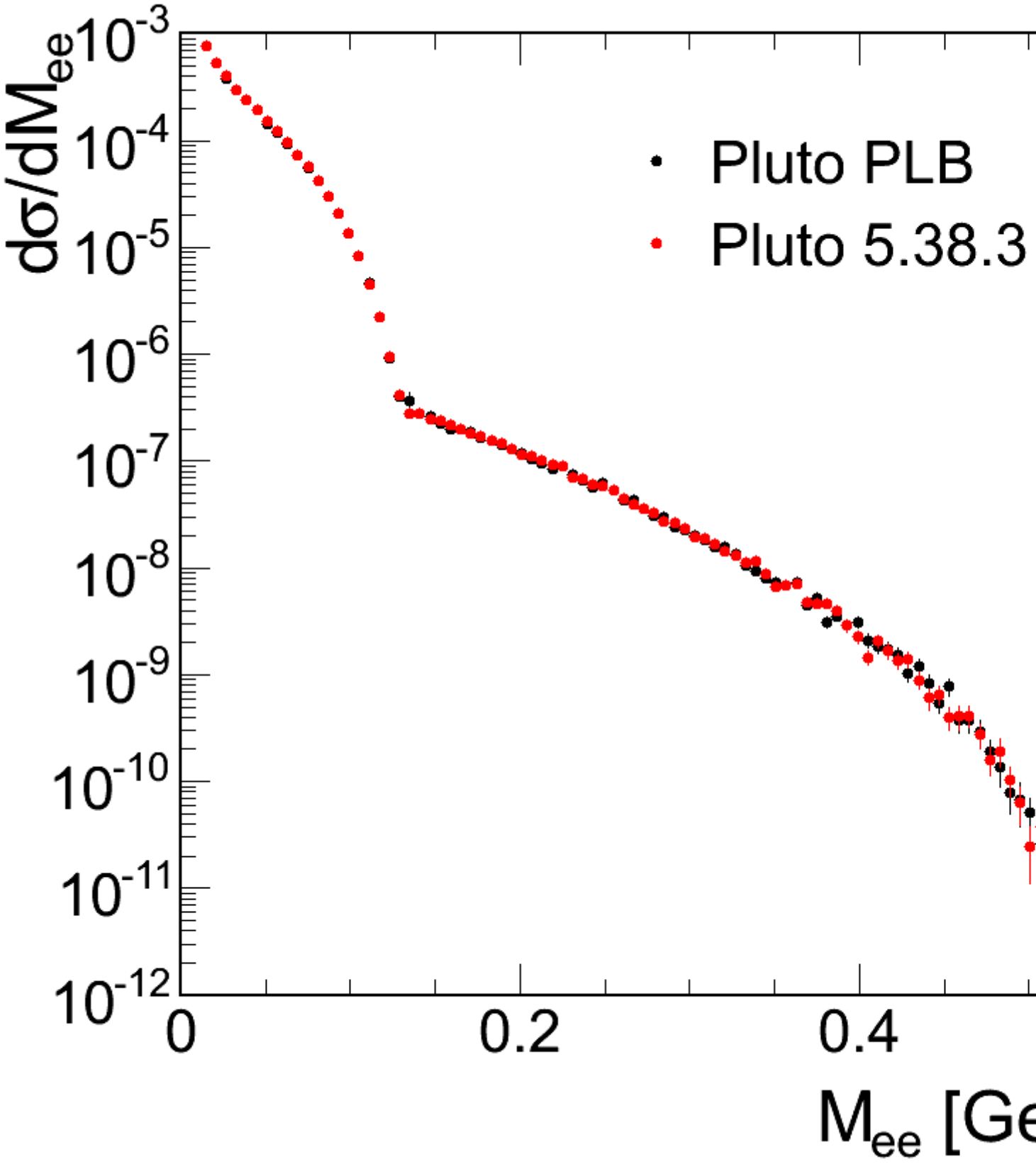
3) Delta_ProtonPi_pp125.gif, downloaded 788 times



4) BR_DeltaPlus_pp125_PlutoPLBvsPluto5382.gif, downloaded 840 times



5) Minv_EpEm_pp125.gif, downloaded 1105 times



Subject: Re: Delta from Krivoruchenko

Posted by Anar Rustamov on Tue, 25 Oct 2011 17:59:44 GMT
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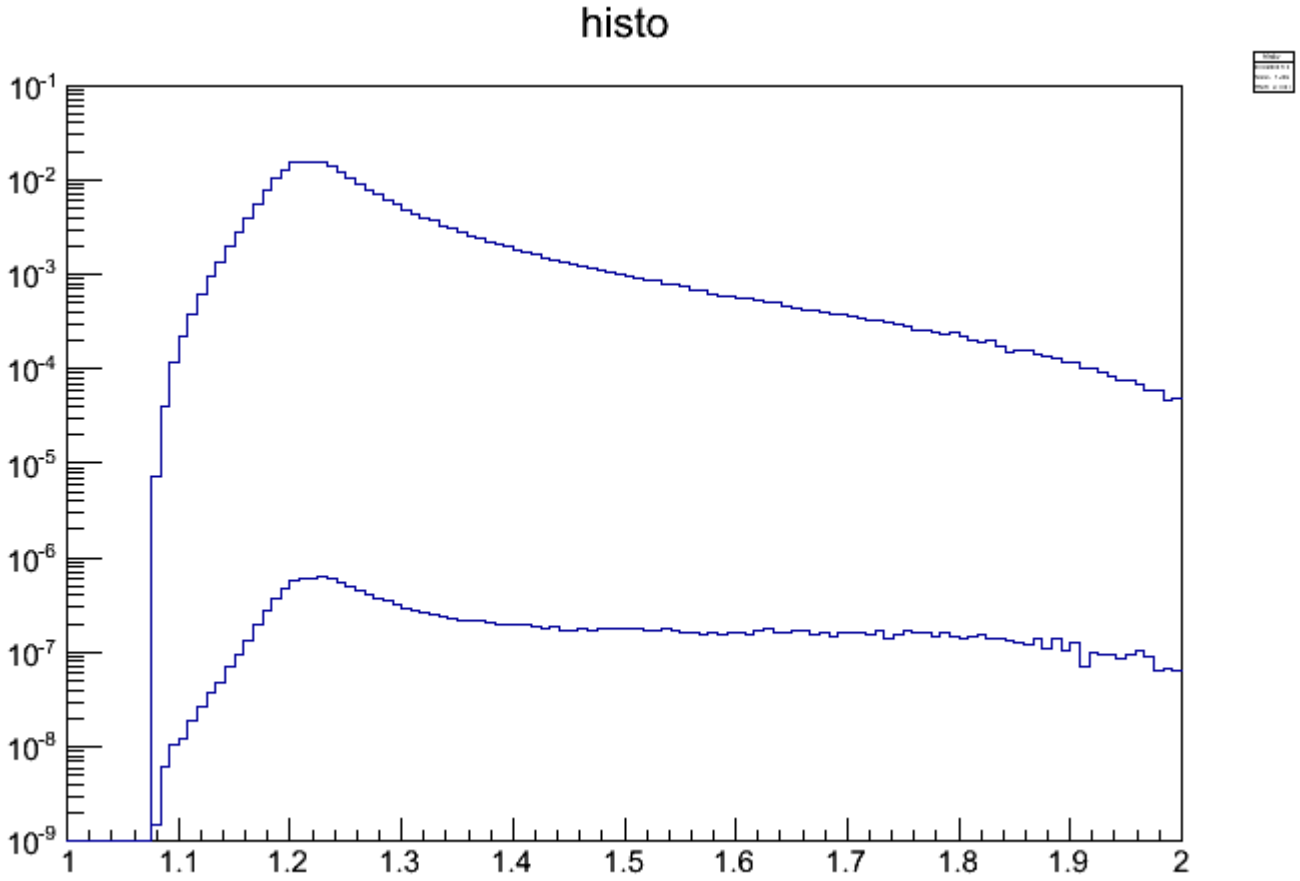
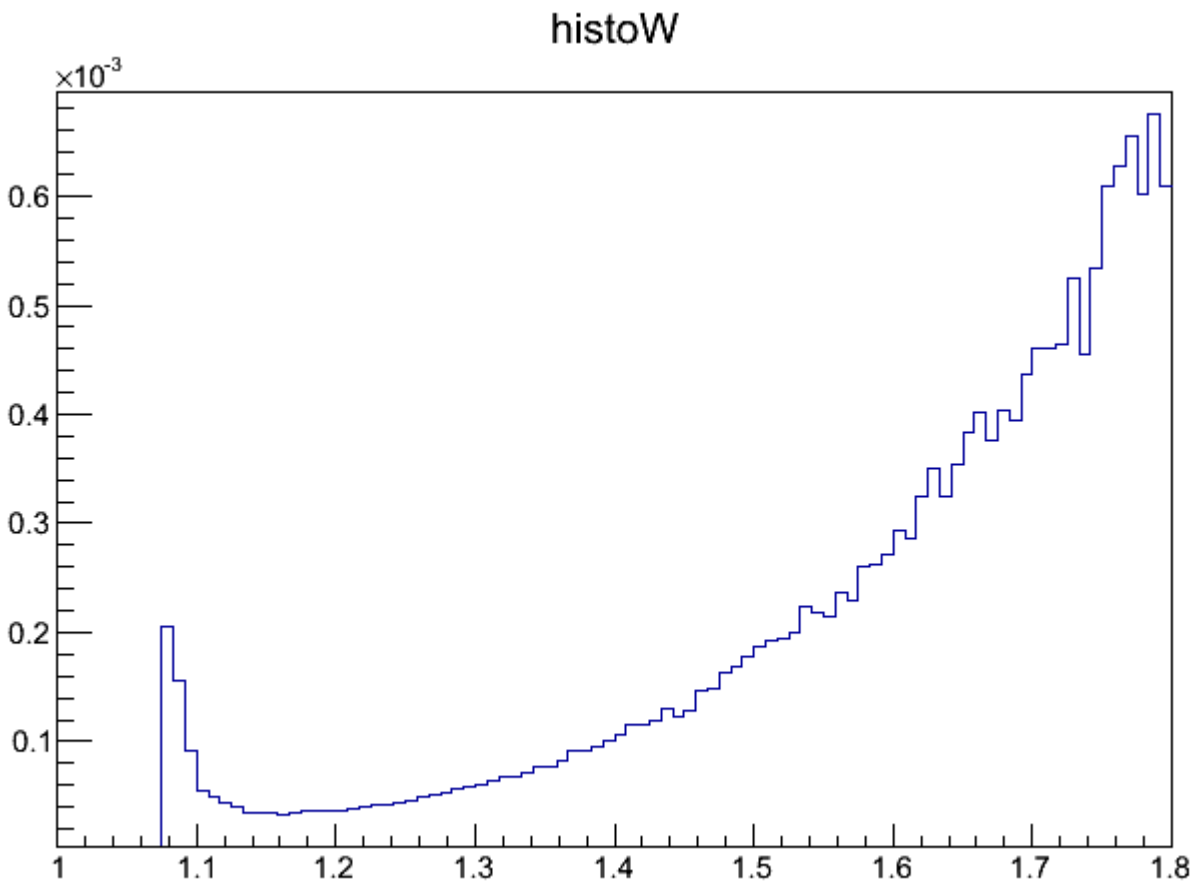
There is also Delta and Rho Branching ratios from my simulation.
Note:
I use PYTHIA output both for the Delta and Rho.
Then I decay Delta inside PLUTO, while Rho I decay myself within VMD;

File Attachments

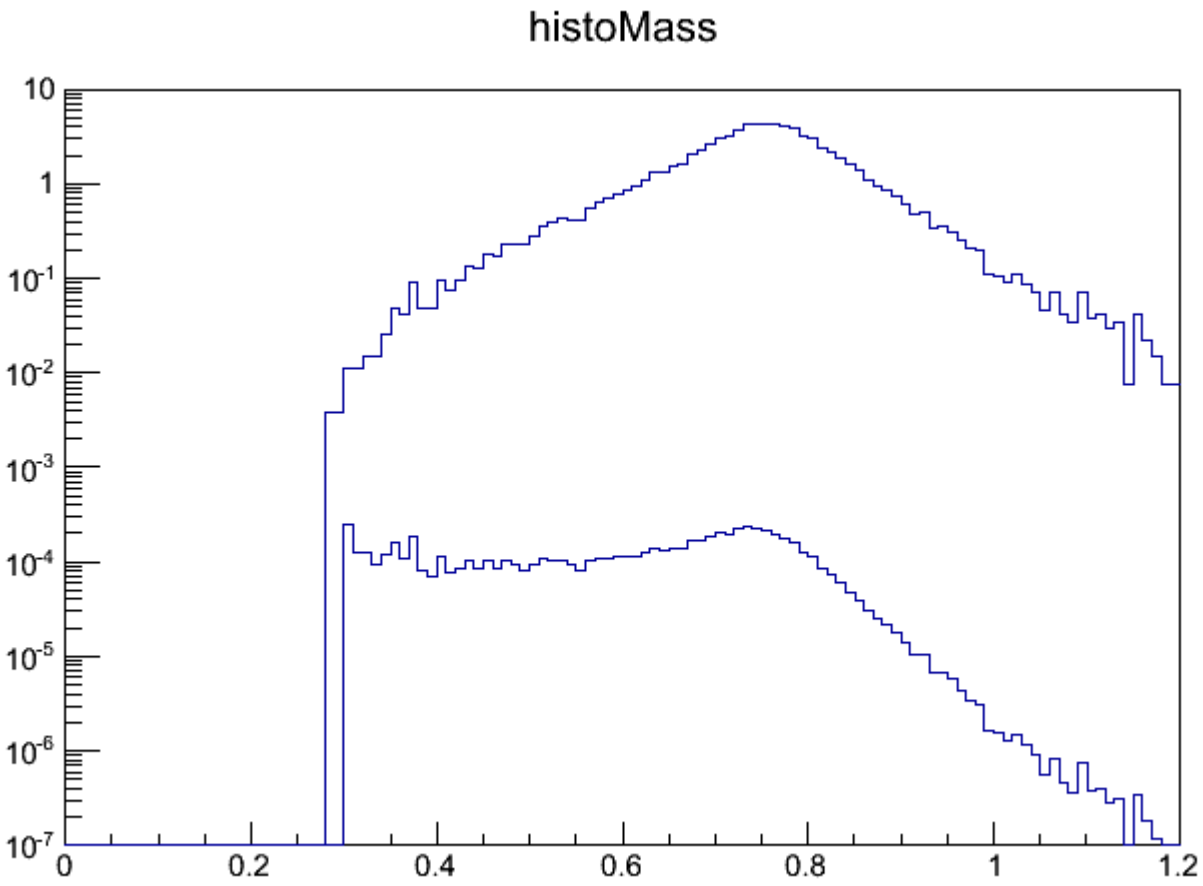
1) deltaMass.png, downloaded 985 times



2) deltaBr.png, downloaded 995 times



3) rhoMass.png, downloaded 1029 times



4) RhoBr.png, downloaded 1023 times