Subject: Problems with Fitters
Posted by Jennifer Pütz on Wed, 18 Apr 2018 07:39:04 GMT

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Dear PandaRoot User,

I have some problems with the mass constraint fit.

Proton pi-.

Up to now, I used the following scheme for my reconstruction (this is a simplification of what I am doing):

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RhoMassParticleSelector* lambdaMassSelector = new RhoMassParticleSelector("lambda0",
fm0_lambda0, 0.3);

RhoCandList piplus, antiproton, lambdabar, xiplus;
RhoCandList LambdaBarFinal;


lambdabar.combine(piplus, antiproton);
lambdabar.Select(lambdabarMassSelector);
lambdabar.SetType(3122);

loop over all lambdabar cands{

 RhoKinVtxFitter vtxfitter(lambdabar[j]);
 vtxfitter.Fit();

 double prob_vtx = vtxfitter.GetProb();


    RhoKinFitter massFitter(lambdabarVtxFit);
       massFitter.AddMassConstraint(fm0_lambdabar0);
       massFitter.Fit();

 double prob_mass = massFitter.GetProb();

 if (prob_vtx>0.01 & prob_mass>0.01){
  LambdaBarFinal.Append(lambdabarVtxFit);
}

combine(LambdaBarFinal, piplus)

....
-----------------------
```
Software:
pandaRoot trunk rev. 30202
FairSoft: my16p1
FairRoot: v.17-03

I am selecting a lambdabar by performing a vertex fit and a mass constraint fit, but pass vertex fitted candidate to the next stage of reconstruction. This candidate has to fulfill the condition, that passed both fits with a probability of more than 1%.

Now, I changed my code to pass the candidate after the mass constraint fit to the next stage of reconstruction. This change is causing a huge loss of events.
Here are some numbers of my output (the sample contains 5000 generated events):

1) pass candidate after vertex fit (but passing both cuts) to next stage

particle type | no. of cand w/o cut (mct)| final selected (mct)

lambda | 2469 | 2236
lambda bar | 2131 | 1663
XiPlus | 1074 | 722
XiPlus Lambda K-| 277 | 168 (after 4C-Fit)

2) pass candidate after mass constraint fit to next stage

particle type | no. of cand w/o cut (mct) | final selected (mct)

lambda | 2469 | 2236
lambda bar | 2131 | 1663
XiPlus | 1075 | 630
XiPlus Lambda K-| 233 | 89 (after 4C-Fit)

I have the feeling that the quality of the fitted candidates in method 2) is worse than in 1).

I also had a look at the probability distributions of the XiPlus (see attachment)

Alessandra Lai made a cross-check with her channel. She observes a difference, too. But in her sample, the effect seems to be small.

She generated 1000 events with 1) dec17 and 2) trunk rev. 30123
The following table shows the reconstruction efficiency of the full decay (all mct) with
a) pass the vtx fitted candidate; b) pass mass fitted candidate

1a) 2.2 %
1b) 1.8 %

2a) 9.3 %
2b) 8.9 %

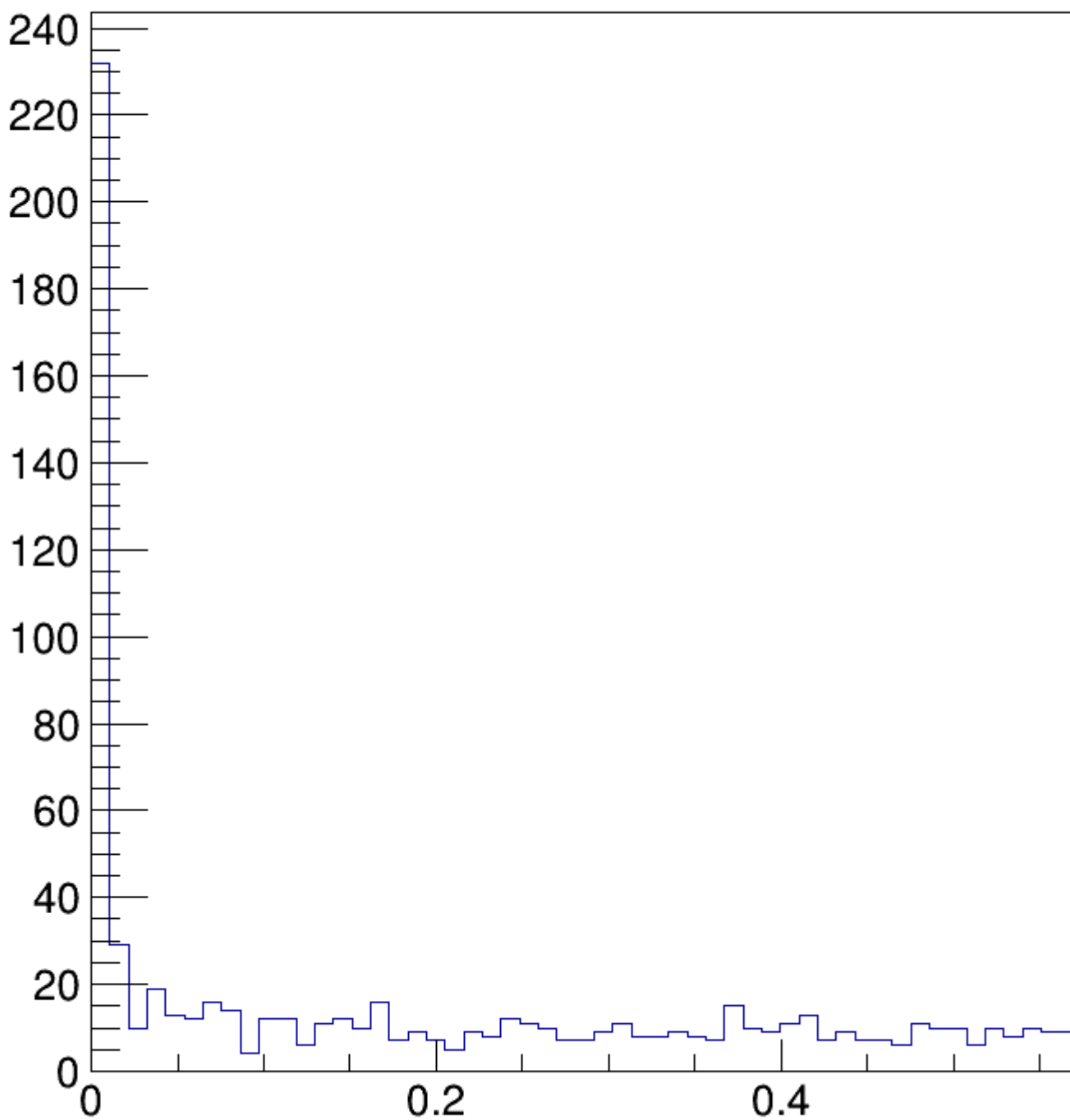Now my question: Is there anyone of you knowing where this comes from?
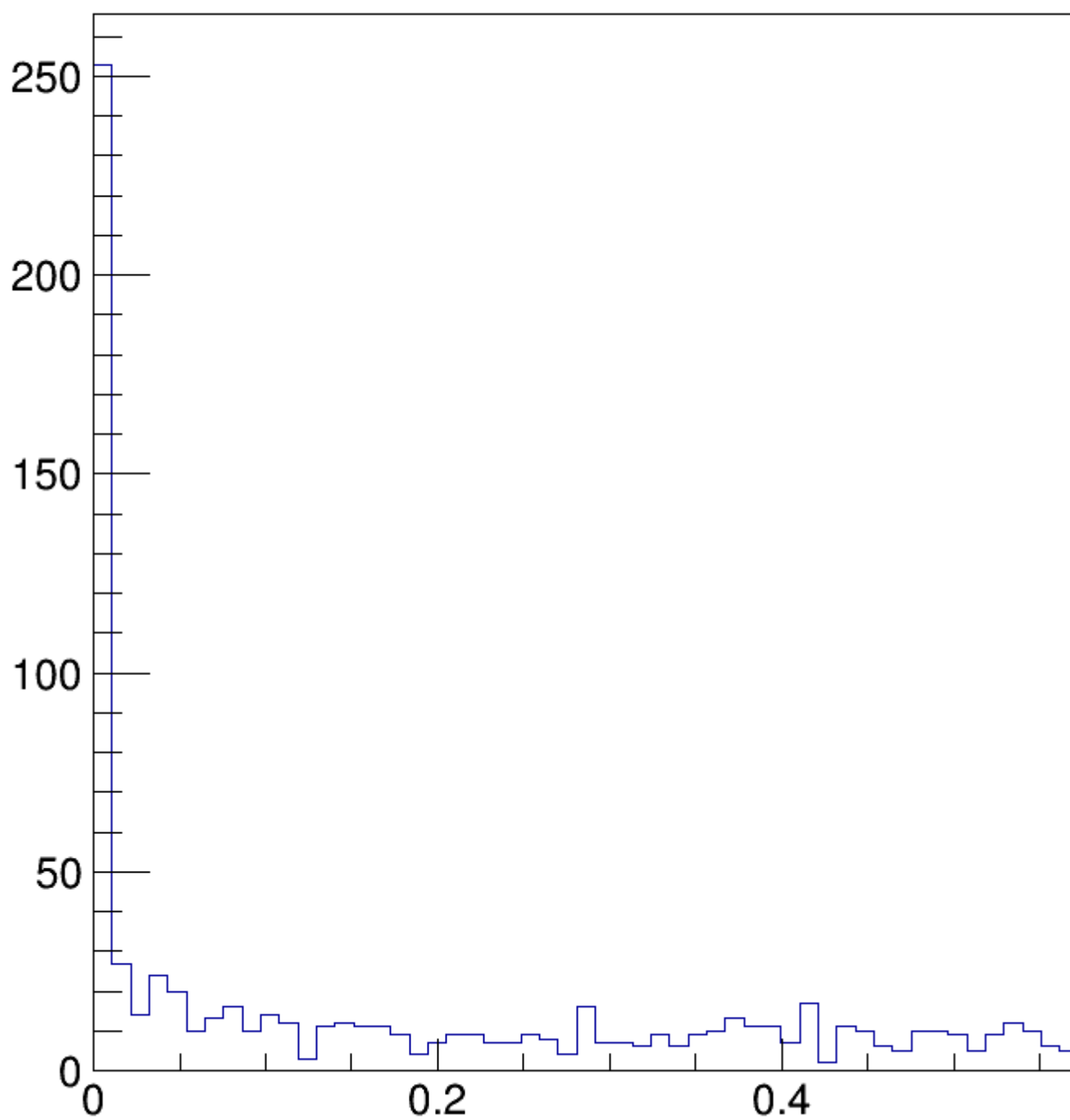
Best wishes

Jenny

VtxFit_prob (pass

3) massfitprob_passvtxfittedcand.gif, downloaded 957 times
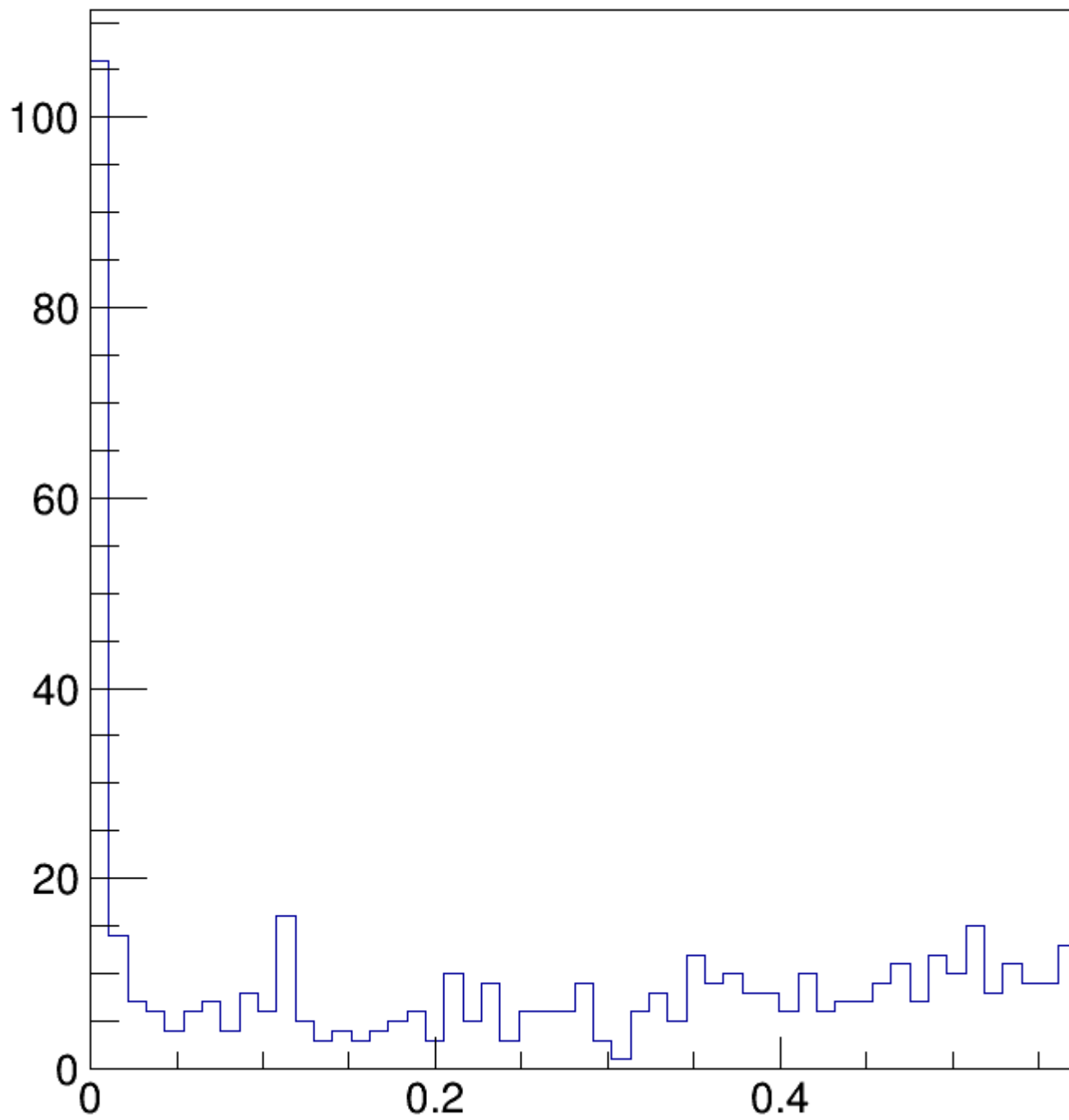
4) massfitprob_passmassfittedcand.gif, downloaded 935 times