Subject: Bremsstrahlung and neutrals mergeing
Posted by Klaus Götzen on Tue, 06 May 2014 12:18:53 GMT
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Hi all,

I just wanted to inform you that I implemented a neutral (cluster) mergeing and bremsstrahlung losses for electrons in the Fast Sim in trunk and scrut14. As default these features are switched off and have to be enabled in the fast sim macro with

```
// enable the merging of neutrals if they have similar direction
fastSim->MergeNeutralClusters();

// enable bremsstahlung loss for electrons
fastSim->EnableElectronBremsstrahlung();
```

The parametrization for the cluster mergeing was motivated by Ronalds talk (see https://panda-wiki.gsi.de/foswiki/pub/Computing/Minutes28April2014/evo14 0428RK.pdf) to roughly match the efficiency on page 11.

The following plot shows the J/psi -> e+ e- mass distribution (from psi'->J/psi pi+ pi- events) without (blue) and with (red) bremsstrahlung:

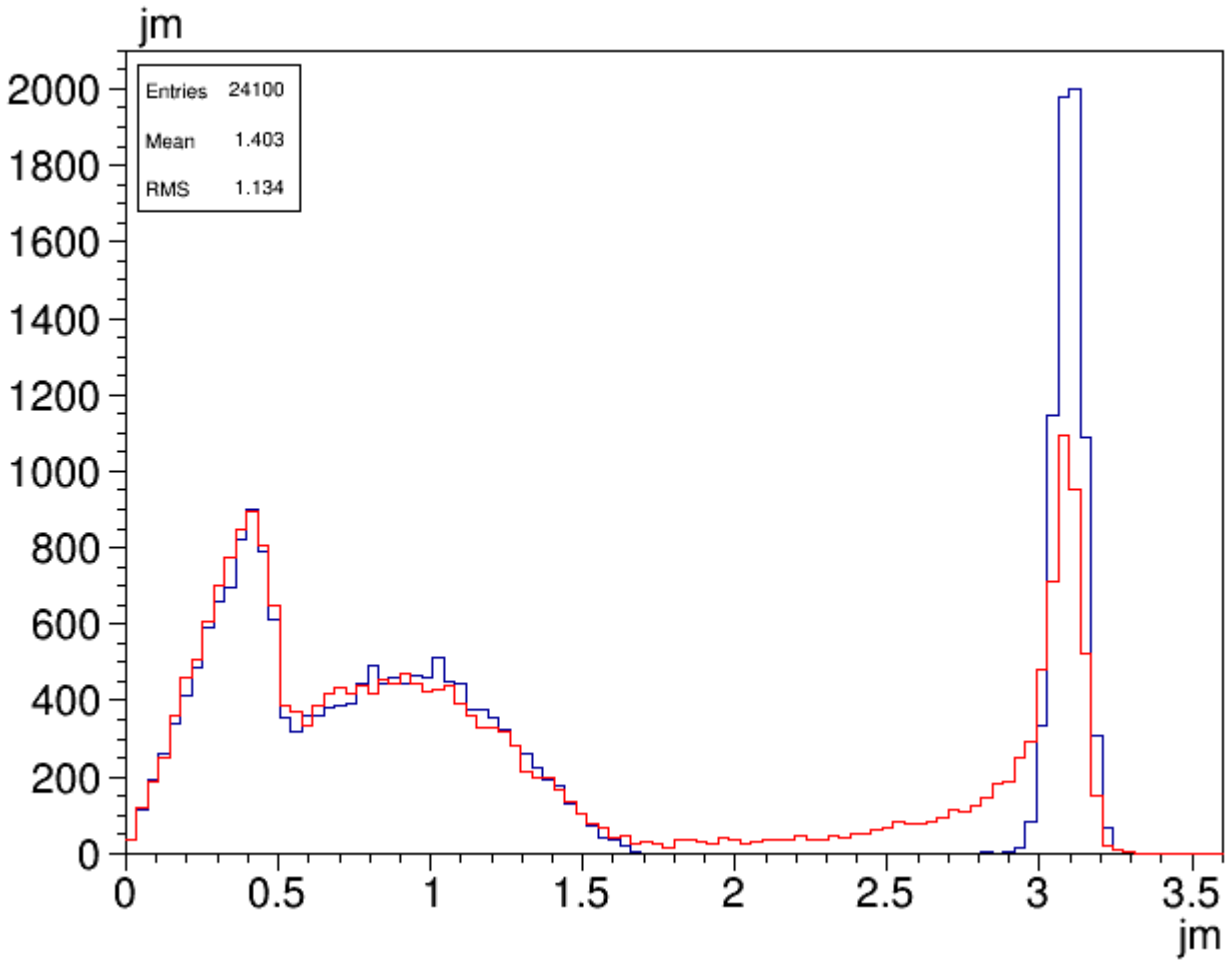
This plot shows the pi0 reco efficiency depending on the opening angle (here from pbarp -> pi+ pi- pi0 events):

You might give it a try and check, whether it behaves like expected. In case of your positive feedback we can also enable the features as default.

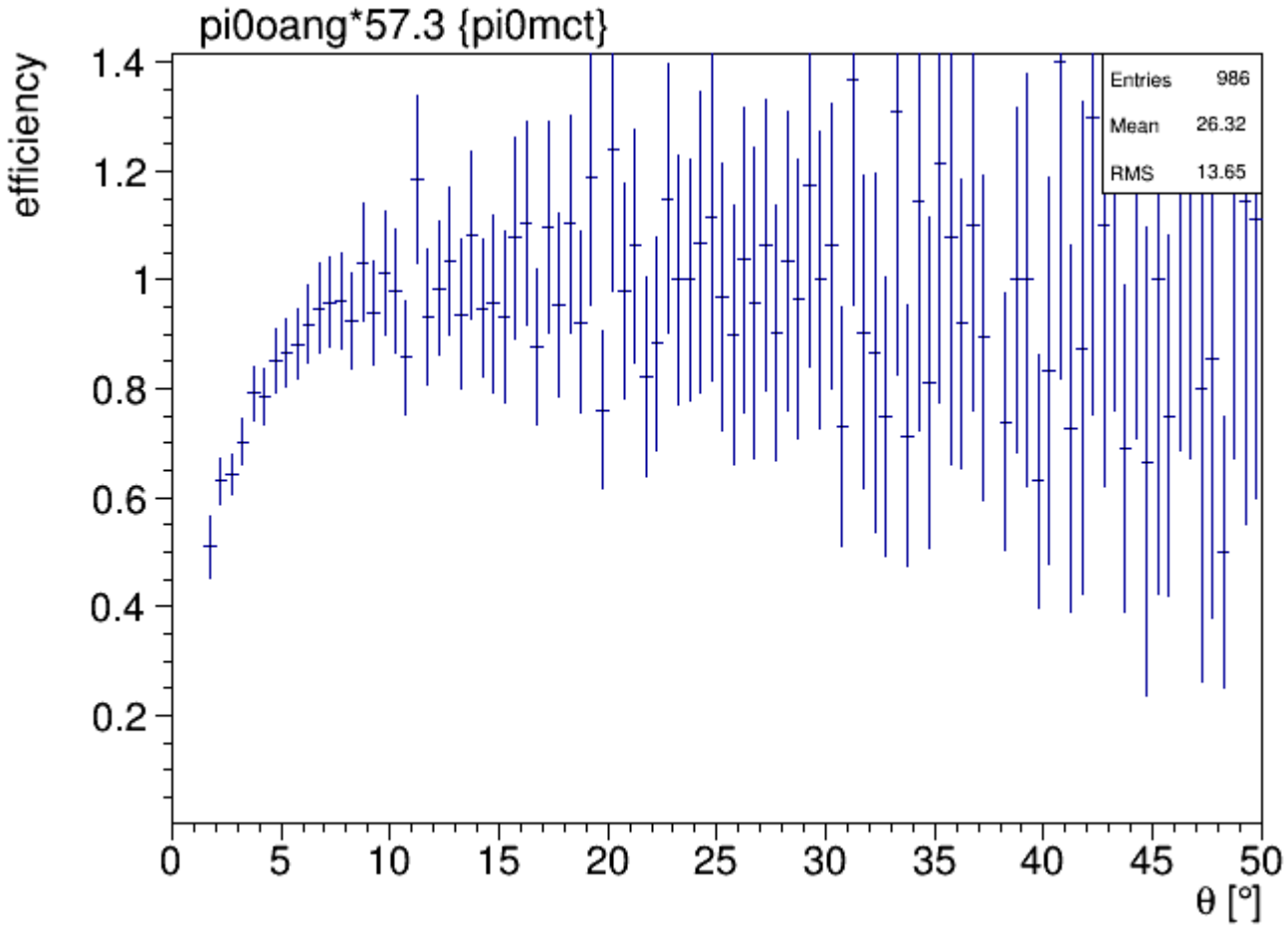
Best,
Klaus

File Attachments

1) j2e_brems.gif, downloaded 1044 times



2) pi0_merge.gif, downloaded 957 times



Subject: Re: Bremsstrahlung and neutrals mergeing
Posted by Elisa Fioravanti on Wed, 07 May 2014 11:43:41 GMT
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Hello Klaus,

I tried the bremsstrahlung for the simulation of the decay:
chi_cj->J/psi gamma
with J/psi->e+e-

I first selected a J/psi from e+e- candidates, and then
I did a 4C fit to the chi_cj candidates.
If I look to the probability of the fit I obtained this distribution:

with a peak at zero.

But when I simulated the same decay mode, using the same macro,
but without the bremsstrahlung, after the 4C fit I obtained this
probability distribution:

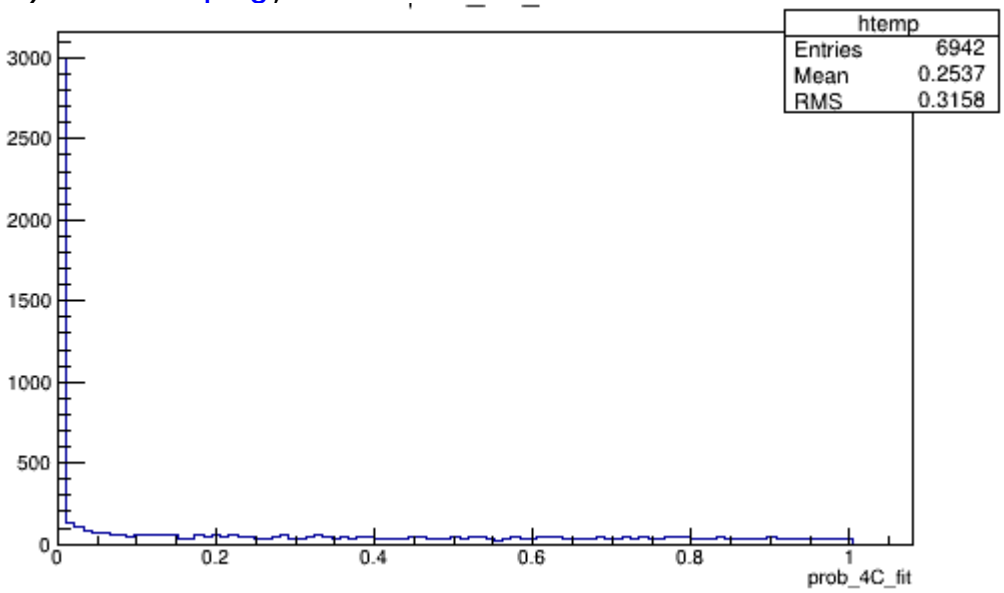
uniform distributed from 0 to 1.

Do you have an idea on what's going on?

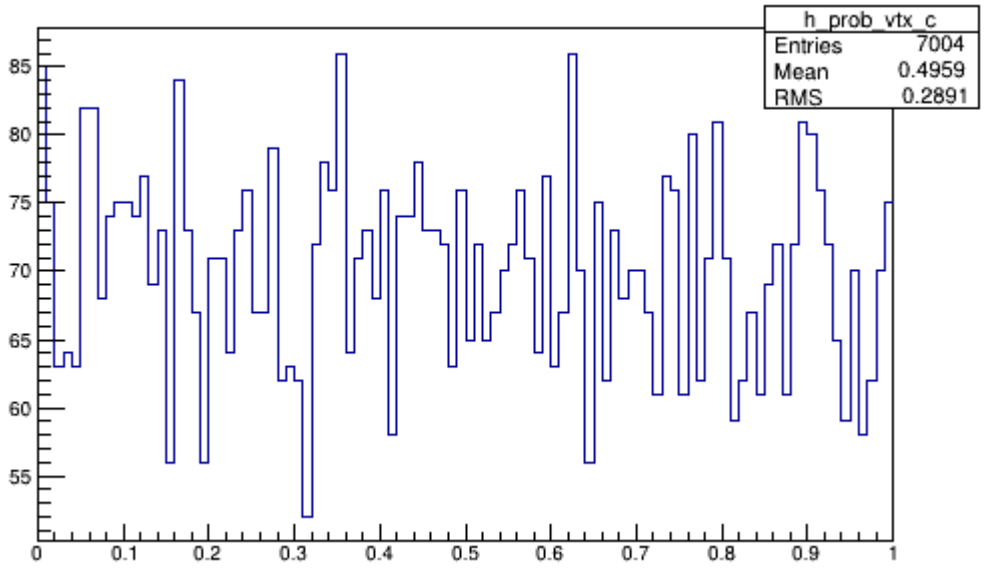
Thanks
Elisa

File Attachments

1) bremm.png, downloaded 696 times



2) nobremm.png, downloaded 654 times



Subject: Re: Bremsstrahlung and neutrals mergeing
Posted by Klaus Götzen on Wed, 07 May 2014 11:57:12 GMT
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Hi Elisa,

I think this is a realistic behaviour in the sense, that the candidates with a large bremsstrahlung

loss don't fit the 4C very well and therefore get low probability. You might check with full mc, whether you see there also a peak for MC truth matched candidates close to 0 ...

Best,
Klaus

Subject: Re: Bremsstrahlung and neutrals mergeing
Posted by StefanoSpataro on Wed, 07 May 2014 11:59:08 GMT
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Hi Klaus,
in this plot it seems that half of the counts (3000) have prob 0. Maybe it is a too high loss in efficiency.

Subject: Re: Bremsstrahlung and neutrals mergeing
Posted by Klaus Götzen on Wed, 07 May 2014 12:22:47 GMT
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Hi,

if you take a look to full sim, it seems quite comparable (at least the shape of the tail). But I could put a parameter controlling at least the probability that bremsstrahlung takes place. This for now is constant about 30%, which I estimated from full sim single particles.

Best,
Klaus

Subject: Re: Bremsstrahlung and neutrals mergeing
Posted by Ralf Kliemt on Wed, 07 May 2014 13:30:35 GMT
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StefanoSpataro wrote on Wed, 07 May 2014 13:59Hi Klaus,
in this plot it seems that half of the counts (3000) have prob 0. Maybe it is a too high loss in efficiency.

Since there are two "electrons" involved in the decay, we have a probability for at least one Bremsstrahlung photon of (1-0.7^2)=0.51. The technically interesting question is: Is it real hard zeros or just very small values (as i would expect).

Cheers
Ralf

Subject: Re: Bremsstrahlung and neutrals mergeing
Posted by Elisa Fioravanti on Wed, 07 May 2014 13:46:23 GMT
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Hello,

I tried to do the same plot in order to see how many events are exactly zero
and the result is 1448 events. I attached the plot.

Elisa

File Attachments

1) zero.png, downloaded 870 times