Subject: Re: PANDA ToF Task Force Questions
Posted by Bertram Kopf on Tue, 14 Jul 2009 10:32:44 GMT
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Dear Vladimir and all others,

sorry for the late reply to your posting. During last week I was out of office and even not online. But here - with a delay of few days - are some answers to your questions/ideas.

vikhrov wrote on Wed, 08 July 2009 13:49
concerning the implication of barrel TOF on PANDA EMC i would propose to make a plot - radiation length of all sub-detectors (MVD, STT/TPC, barrel TOF, barrel DIRC) until EMC versus polar angle. The similar plot was already done for beam & target pipes and MVD (look for example Rene Jakel report on collab. meeting 11.12.2007).

You can find below the X0 plot for the geometry which we have used for our TOF simulation studies. The barrel ToF is not included here (see also EmcTDR and Physics Book):

vikhrov wrote on Wed, 08 July 2009 13:49
Barrel TOF could be included in 3 options:

1) RPC (X/X0 ~6% as declared, but overlapping and realistic material budget should be taken into account)
2) Scintillator TOF with constant thickness in Z (let it be 4 cm)
3) so called "tapered" scintillator, with ~constant X/X0 versus Z

During the last collab. meeting Bertram Kopf presented the result of his MC simulation for the second option. He didn't found strong theta dependence in losses of efficiency of pi0 reconstruction and S/B ratio (pp. 10&11 of his report). This is what i would like to understand. For the particles coming from the interaction point (it is true for the gammas from pi0 decay) radiation length depends on polar angle - if at theta=90deg barrel TOF has a X/X0=10% then at 30deg it will be 20% (two times!) and at 20deg will be 29%. But we see 2% drop in efficiency loss at 20deg only. If somebody understand this?
I think we need to continue our MC simulation to understand how barrel TOF material can affect on EMC versus polar angle.

You are right! One can see just a slight theta dependence. The reason I think is that these plots are the average efficiency and S/B ratio over the hole pi0-momentum range (between 10MeV/c and ~1.6 GeV/c) and that the cos(theta) angle of the pi0 is plotted on the x-axis. As you know, the pi0 decays into two photons with a specific (minimum) opening angle.The plot at (this is just a web-link since it seams to be not possible to upload more than 1 file here):
http://www.ep1.rub.de/~bertram/plot14.png
shows the momentum dependency of the opening angle. That means that the the direction of the two photons can be strongly different to the pi0 direction.

Best regards,
Bertram.

File Attachments

1) X0.png, downloaded 1283 times

