Subject: Kalman low efficiency
Posted by Susanna Costanza on Thu, 02 Jun 2011 10:04:07 GMT
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Dear all,
while analysing the data samples of single track events simulated for the STT/TPC comparison, we have noticed something strange: the reconstruction efficiency after the Kalman fit is much lower than the efficiency after the STT+MVD pattern recognition, especially for low momentum tracks.

In the following table, an example of the efficiencies of the STT pattern recognition, the STT+MVD PR and of the Kalman fit are reported:

Muons @ 0.3 GeV/c, theta = 40°
STT alone PR: 87%
STT+MVD PR: 97%
KALMAN : 65%

Muons @ 1 GeV/c, theta = 40°
STT alone PR: 87%
STT+MVD PR: 94%
KALMAN : 89%

The efficiency is calculated as (integral in peak)/(number of generated events), where the peak is defined as the range (mean-3sigma, mean+3sigma).
As you see, the high efficiency of the STT+MVD pattern recognition is reduced after the Kalman.

Two plots are attached to the message, showing the momentum distributions obtained with the STT alone (black), with the STT+MVD reconstruction (red) and after the Kalman (blue), again for muons at 0.3/1 GeV/c and theta = 40°.
As it is shown in the file "03GeV_40deg.pdf", the Kalman produces long tails in the momentum distribution, causing a lower efficiency in peak; these tails are not present in the other two distributions. In addition, the distribution is no more gaussian.
The tails are not present in the Kalman 1 GeV/c distribution; nevertheless, the efficiency is lower than the STT+MVD one also in this case.

Is there something going wrong in the Kalman?
Has someone already noticed this behaviour or has any idea/suggestion?
Is it possible for the detector experts to check if the recohit covariances are correct?

Thank you.
Ciao,
Susanna

File Attachments

1) 03GeV_40deg.pdf, downloaded 504 times
2) 1GeV_40deg.pdf, downloaded 503 times