Progress of global tracking

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Reminder of problems of the global tracking

- Test with the pipiJpsi events
- Good track: $|V_{xy}| < 1 \text{cm}$, $|V_z| < 10 \text{cm}$, $|\cos \theta| < 0.93$, $Q_{rec} = Q_{truth}$

	Boss665p01 (IDC)	HoughV12 (CGEM-IT)	HoughV13 (CGEM-IT)
4 good tracks events (%)	63.25	60.16	62.68
$(\chi_{4C}^2 < 200)$ events (%)	57.36	51.37	50.14
$(\chi_{4C}^2 < 60)$ events (%)	38.70	30.14	25.36

• Check the Kalman filter results of event tracks in the pipiJpsi events

	Boss665p01 (IDC)	CgemBoss665b (CGEM-IT)	HoughV12 (CGEM-IT)	HoughV13 (CGEM-IT)
Kalmam filter failure rate (%)	1.3	3.0	4.1	15.4

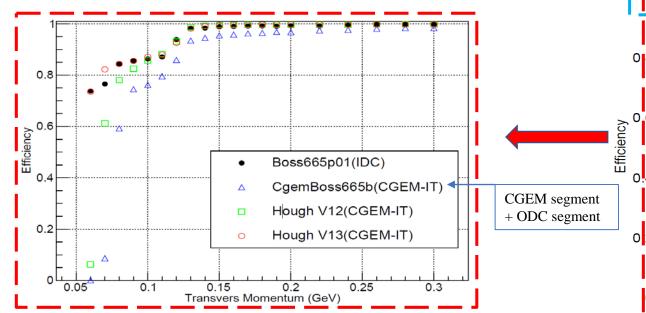
- Kalman filter take initial track parameters of global fitting and hits as input. Failure may cause by:
- ① Bad initial parameters ? \rightarrow Check the resolution of global fitting result
- ② Bad hits ? \rightarrow Need to find out the common features of bad hits to drop them

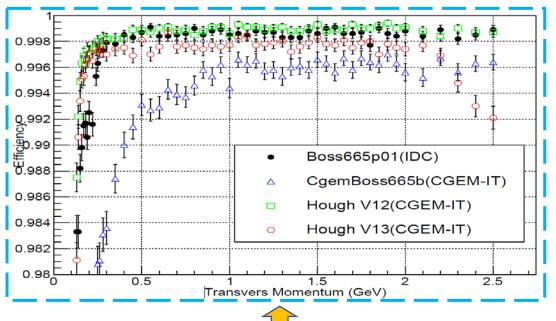
Tracking Efficiency

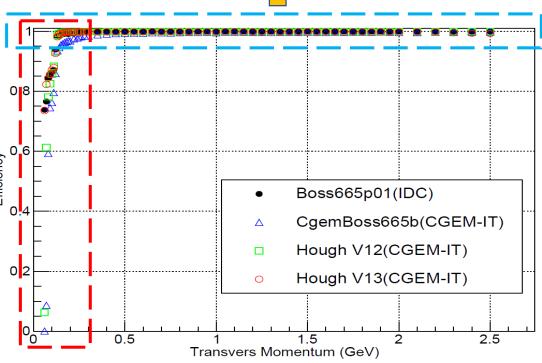
• Sample: fix transvers momentum of single-track μ^- (60MeV~2.5GeV)

$$efficiency = \frac{\text{reconstructed } good \ track \ number}{total \ simulated \ track \ number}$$

- **count only once** for tracks that reconstructed twice of more
- Good tracks:
 - $\triangleright |V_{xy}| < 1$ cm, $|V_z| < 10$ cm,
 - $\triangleright |\cos \theta| < 0.93$, $Q_{rec} = Q_{truth}$





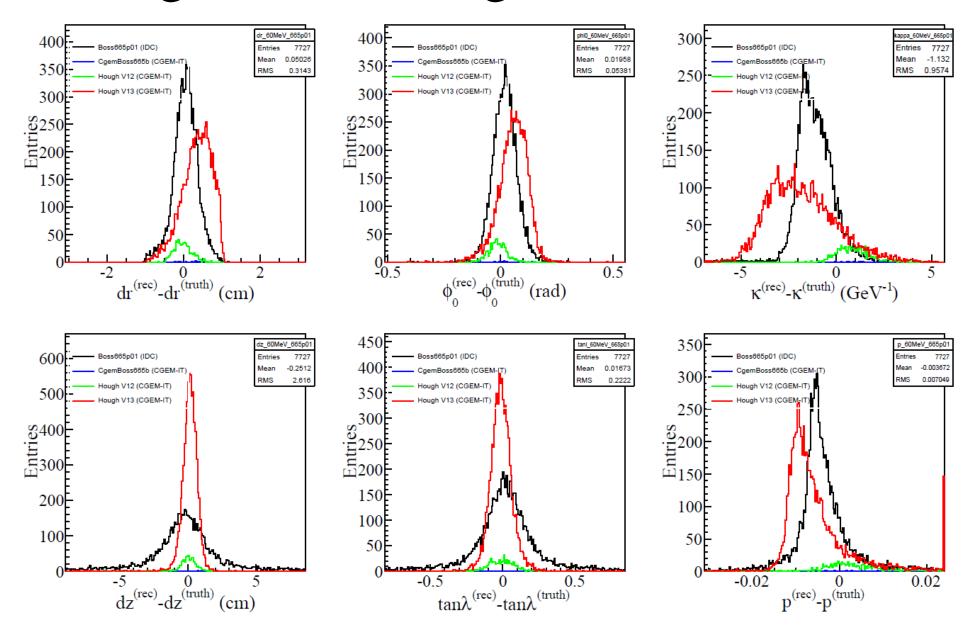


Resolutions of global tracking

• 60MeV

> $|V_{xy}|$ < 1cm, > $|V_z|$ < 10cm, > $|\cos \theta|$ < 0.93,

 $> Q_{rec} = Q_{truth}$



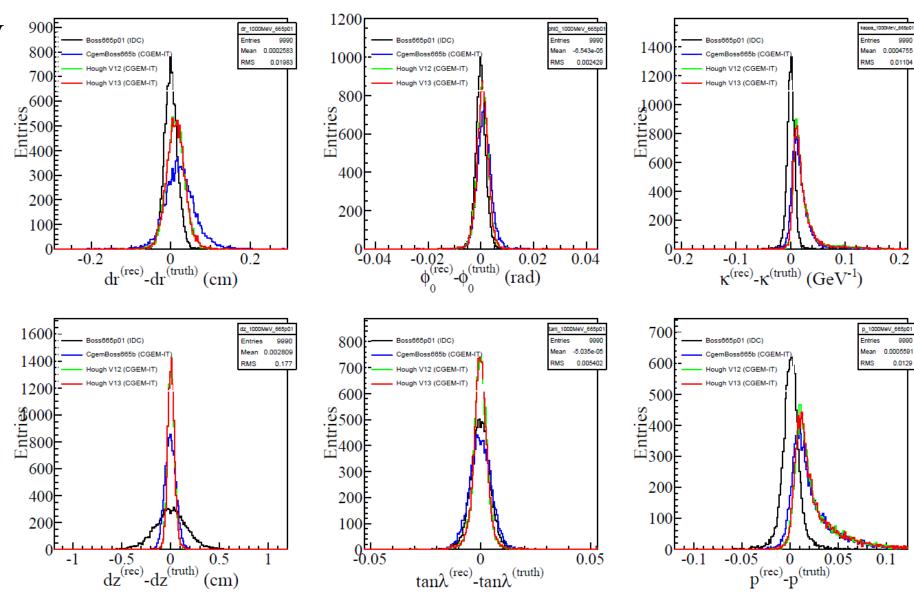
Resolutions of global tracking

Entries Entries 600 Mean -0.005338 Mean 0.001743 • 100MeV RMS 0.03308 0.294 lough V12 (CGEM-IT 500 500 Hough V13 (CGEM-IT) Hough V13 (CGEM-IT Hough V13 (CGEM-IT) 500 Entries 000 8400 Entries 300 Entries 300 $> |V_{xy}| < 1$ cm, $> |V_z| < 10$ cm, 200 $> |\cos \theta| < 0.93,$ 200 200 $\triangleright Q_{rec} = Q_{truth}$ 100 100 100 $2 \phi_0^{\text{(rec)}} - \phi_0^{\text{(truth)}} \text{ (rad)}$ dr^(rec)-dr^(truth) (cm) $\kappa^{(\text{rec})}$ - $\kappa^{(\text{truth})}$ (GeV⁻¹) 600F 1200 Entries Boss665p01 (IDC) Entries 8925 Boss665p01 (IDC) Boss665p01 (IDC) Mean -0.001466 Mean -0.03314 Mean 0.001201 1000 500 RMS 0.003925 0.9967 RMS 0.08047 1000 ough V12 (CGEM-IT Hough V13 (CGEM-IT Hough V13 (CGEM-IT) ough V13 (CGEM-IT) 800 400 Entries 009 Entries 000 Entries 000 400 200 400 200 100 200 0-0.4 $dz^{\text{(rec)}} - dz^{\text{(truth)}}$ -0.20.2 0.4 -0.010.010.02 $tan\lambda^{(rec)}$ -1-tan $\lambda^{\text{(truth)}}$ p^(rec)-p^(truth)

Resolutions of global tracking

• 1000 MeV

 $|V_{xy}| < 1 \text{cm},$ $|V_z| < 10 \text{cm},$ $|\cos \theta| < 0.93,$ $|\cos \theta| < 0.93,$



Further study plan

- Resolution may not be the reason of Kalman filter failure. But need further test
 - → plan to replace the initial parameters with the truth value to test.
- Maybe need to find out the common features of bad hits of the track
 - ind out the bad hits of the track
 - → analyze their features (flight length, fake cluster, drift distance ...)
 - → find out the common features