Geometrical efficiencies of a 3-sector Pixel prototype via GEANT

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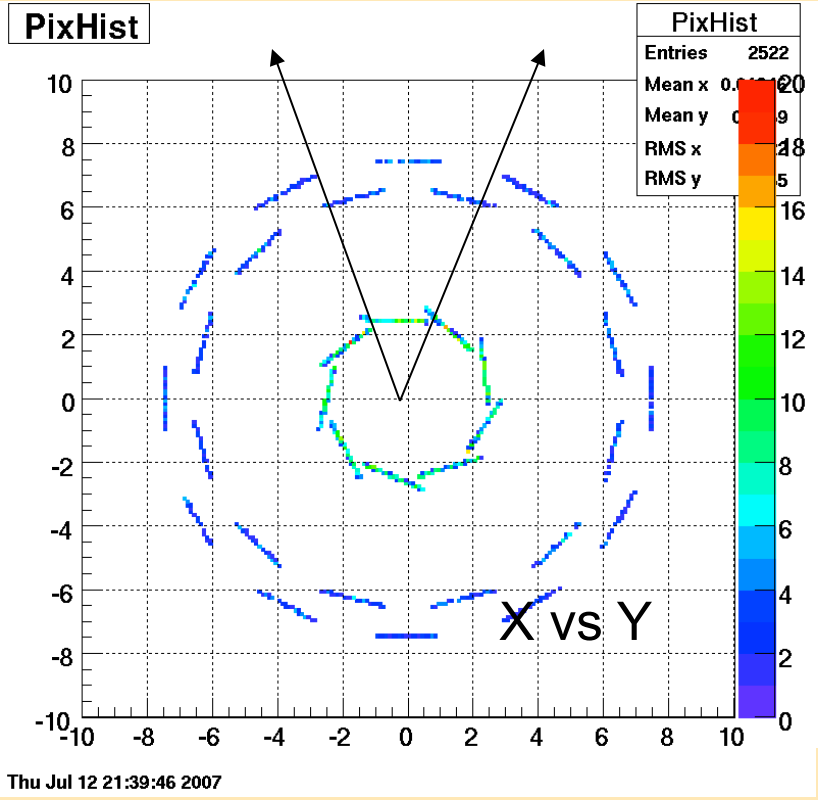
Original note based on a MathCAD simulation by H.Wieman
http://www-rnc.lbl.gov/~wieman/D_efficiency.htm and
http://www-rnc.lbl.gov/~wieman:D_efficiency_2.htm
(you need IE or other compatible browser)

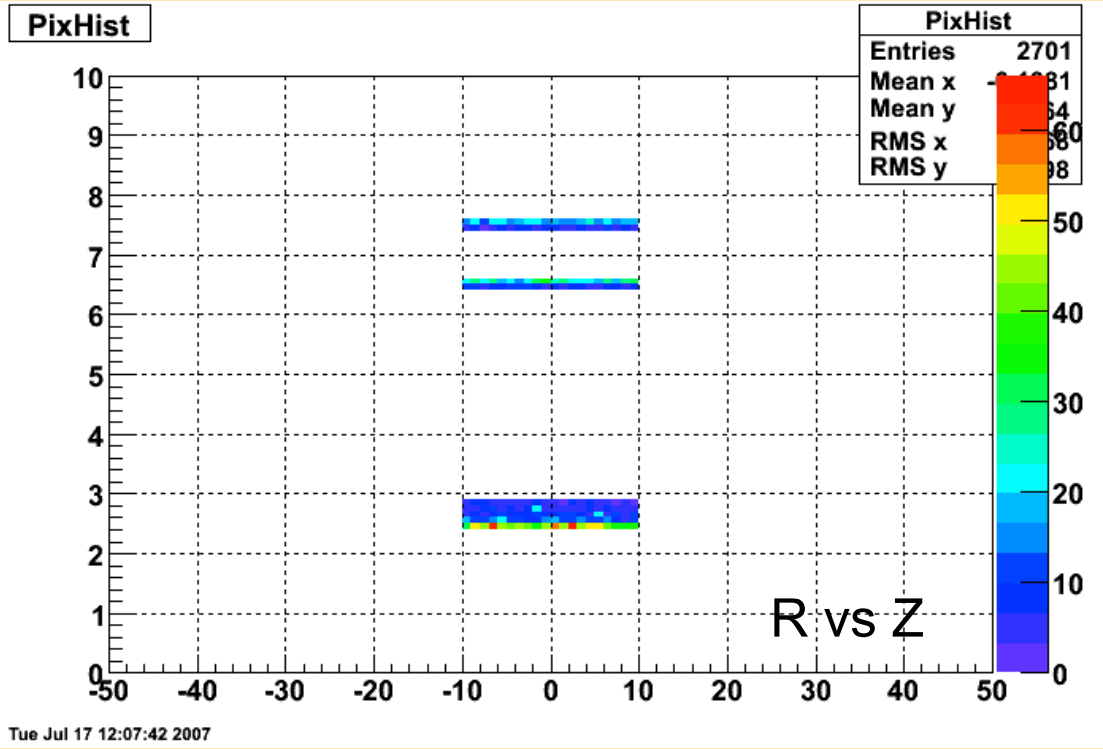
Input data used

We used 'data' from our own production using the UPGR13 geometry to best match Howard's input

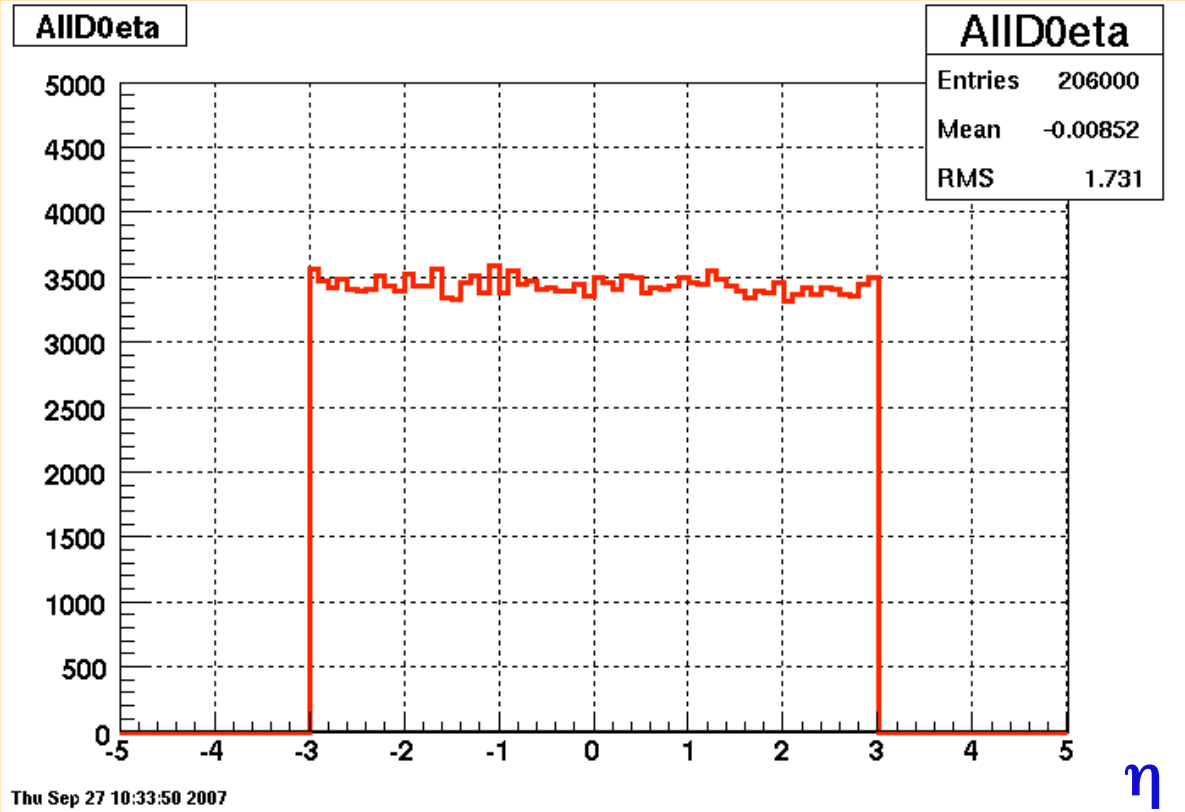
Sept 28, 2007

UPGR13 GEOMETRY

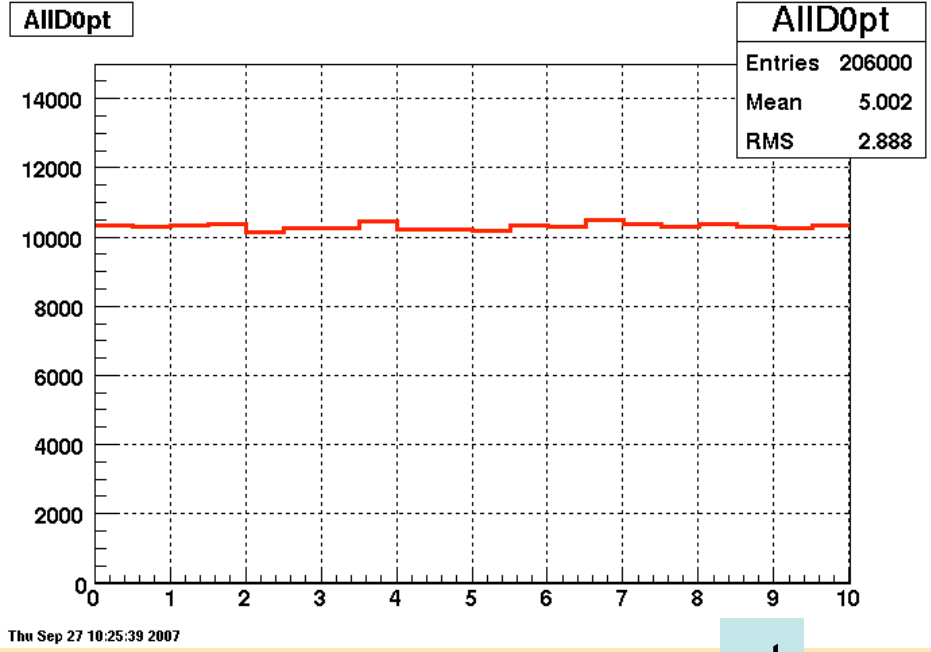




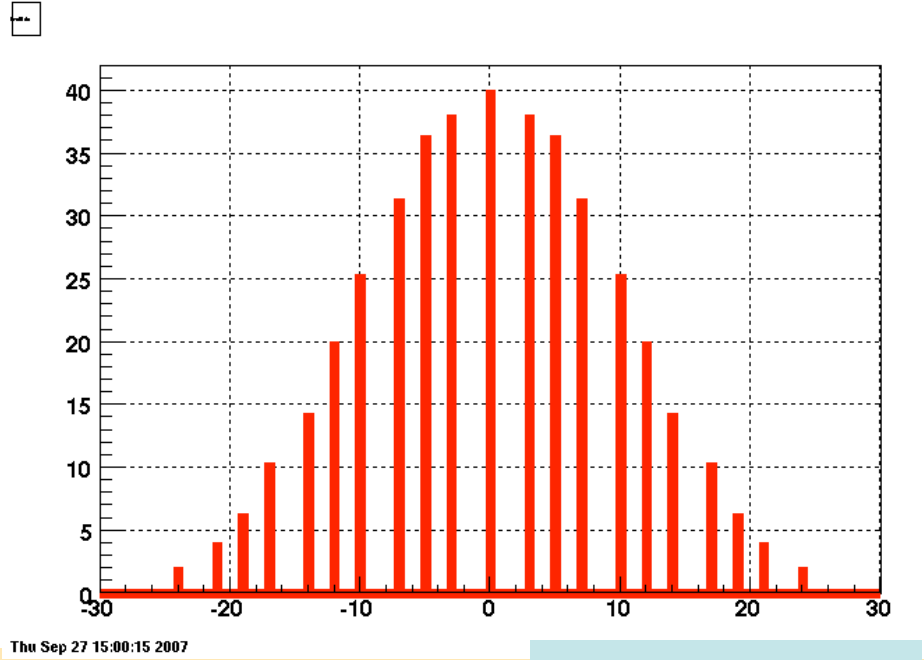
- Detector hits look fine
- Extends to |z|<=10cm
- One Inner ladder covers 40 degrees in Phi



Our input has D0s uniformly in |eta|<=3 like HW

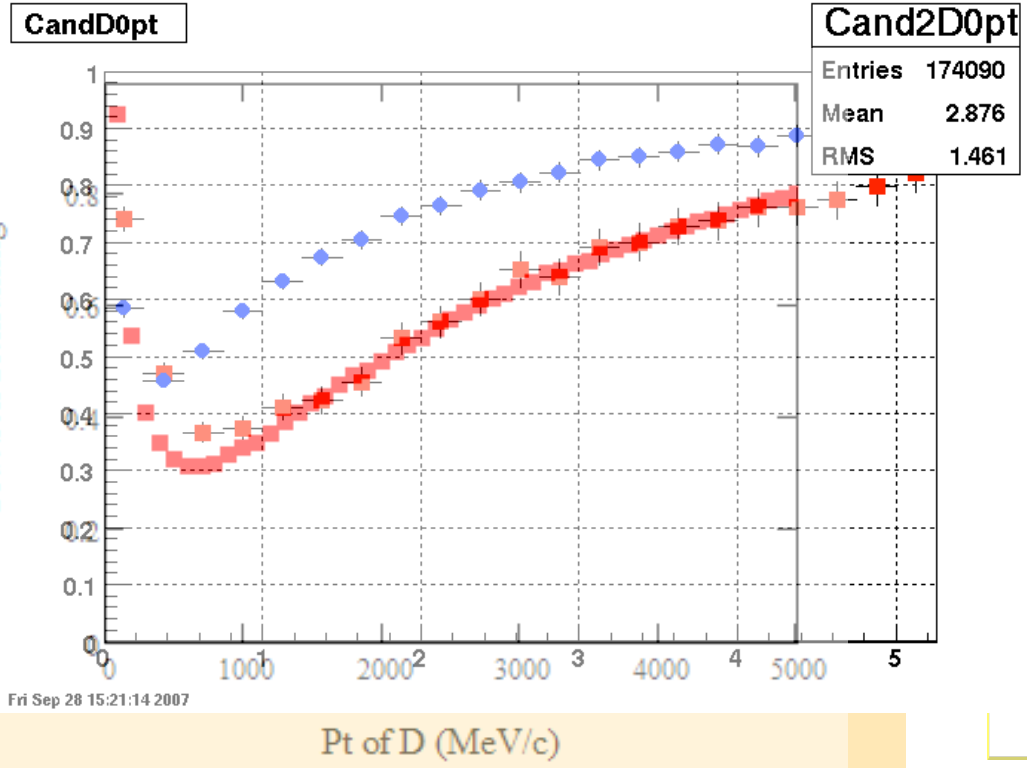


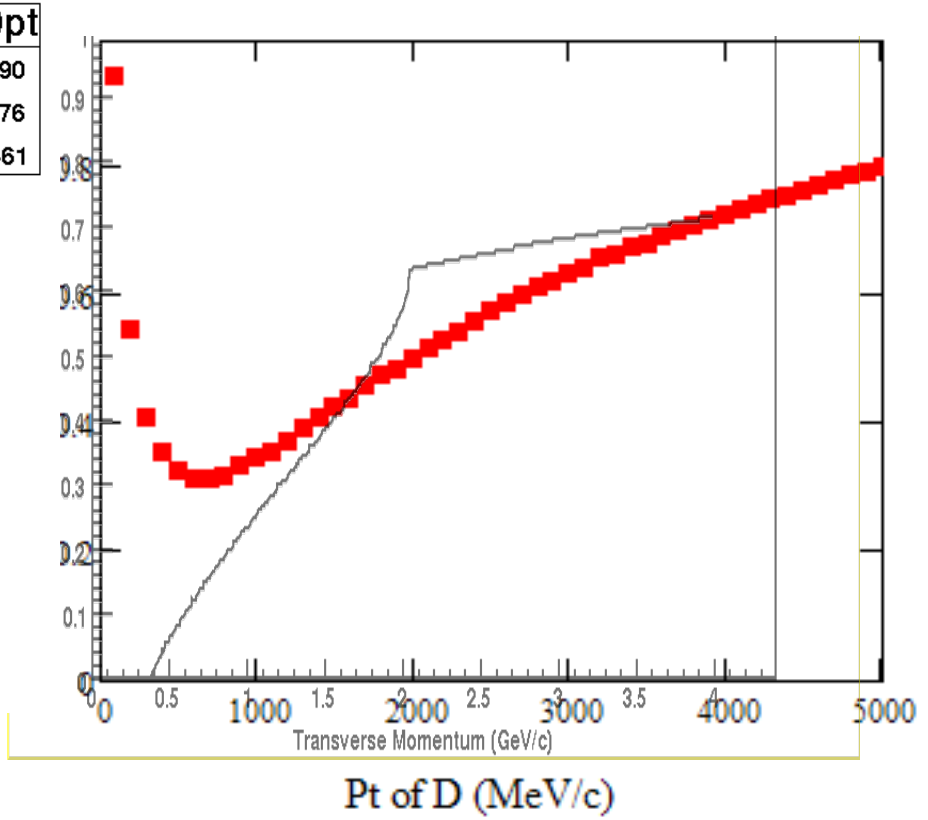
pt



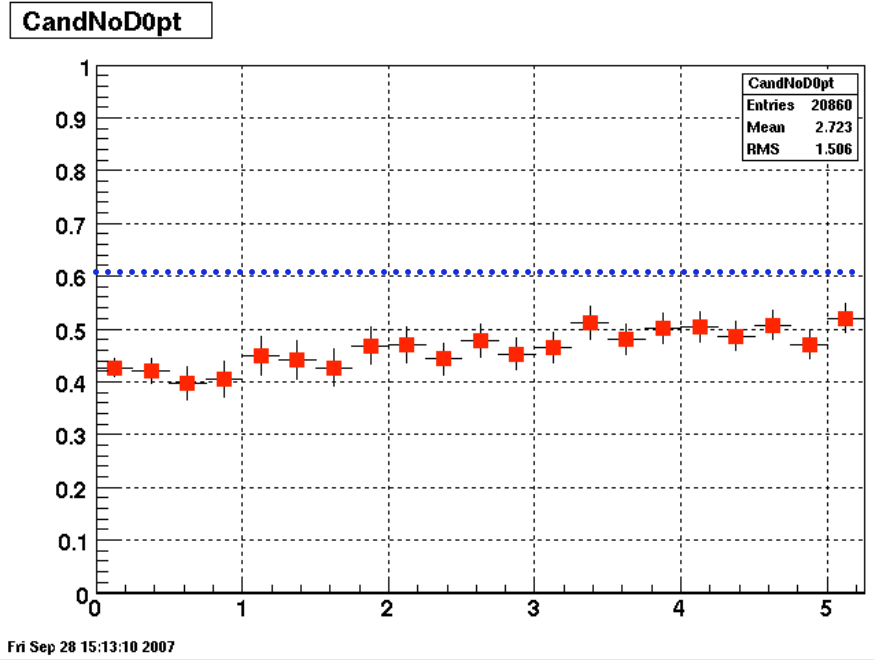
Event_Vertex_Z (cm)

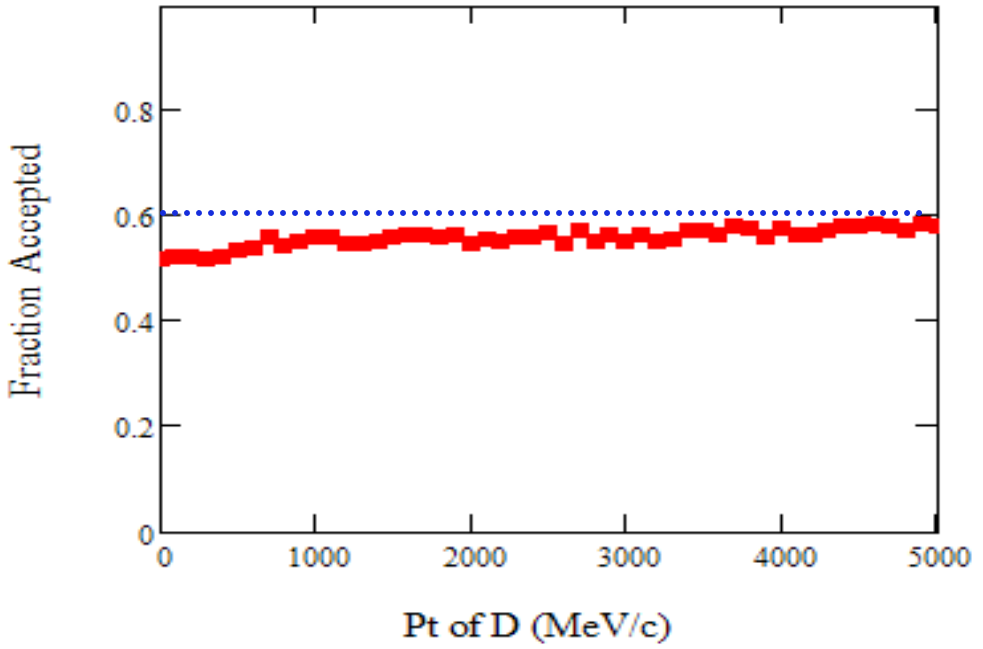
- **D0s are flat in pt**
- **Event vertex gaussian with σ = 10 cm like HW**





Excellent agreement now





Fraction of D0s that daughters have **|eta|<= 1 and p>=0.8GeV and** are intercepted in the 'detector'.

My detector

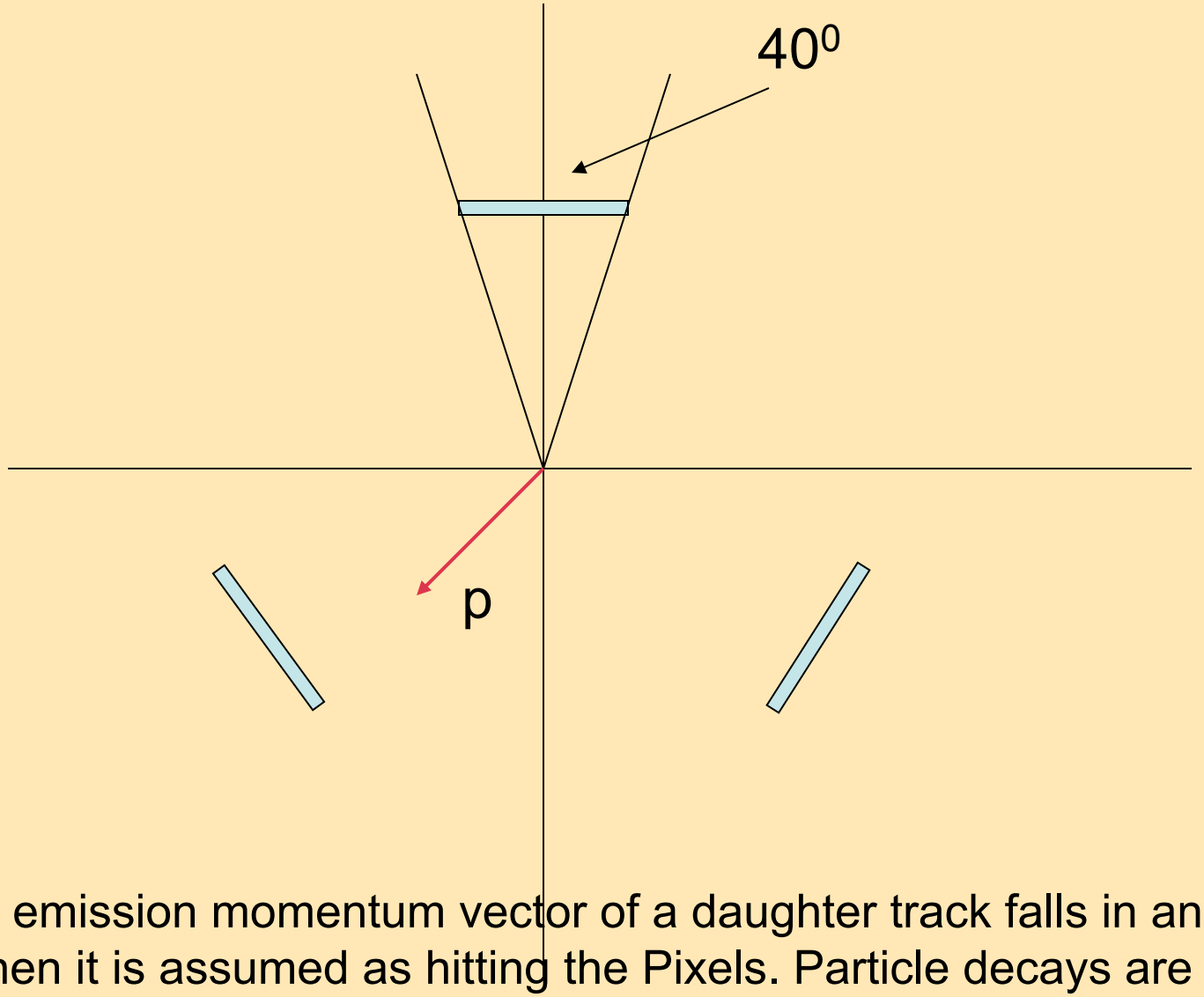
- UPGR13 geometry AND daughters must also have
- >=10 TPC hits
- NPixHits >=2
- 'particles decay'

HW detector

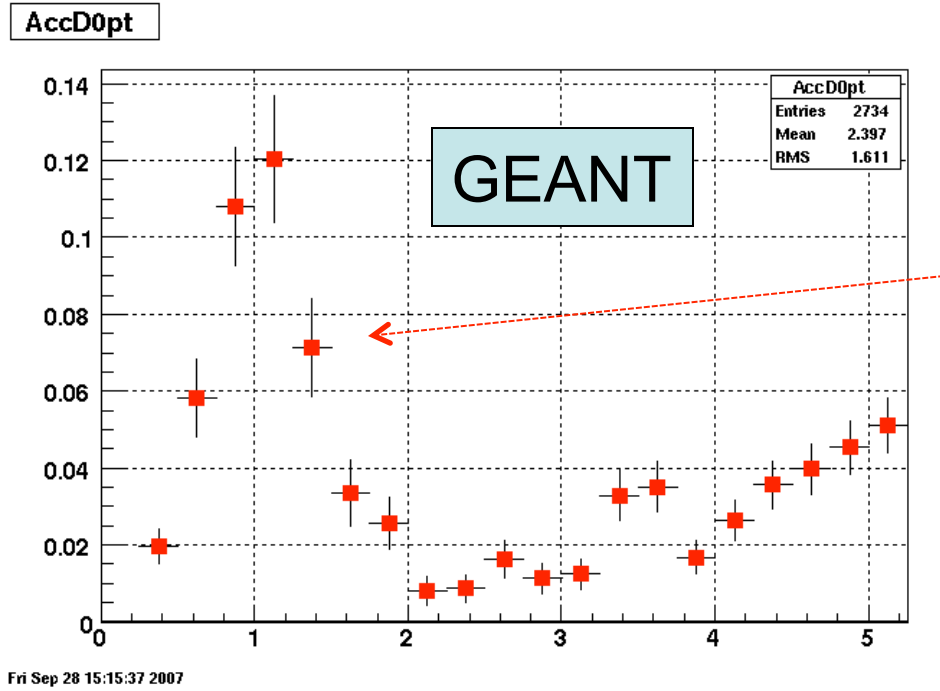
- Single Cylindrical surface at 8 cm radius only (same z coverage)

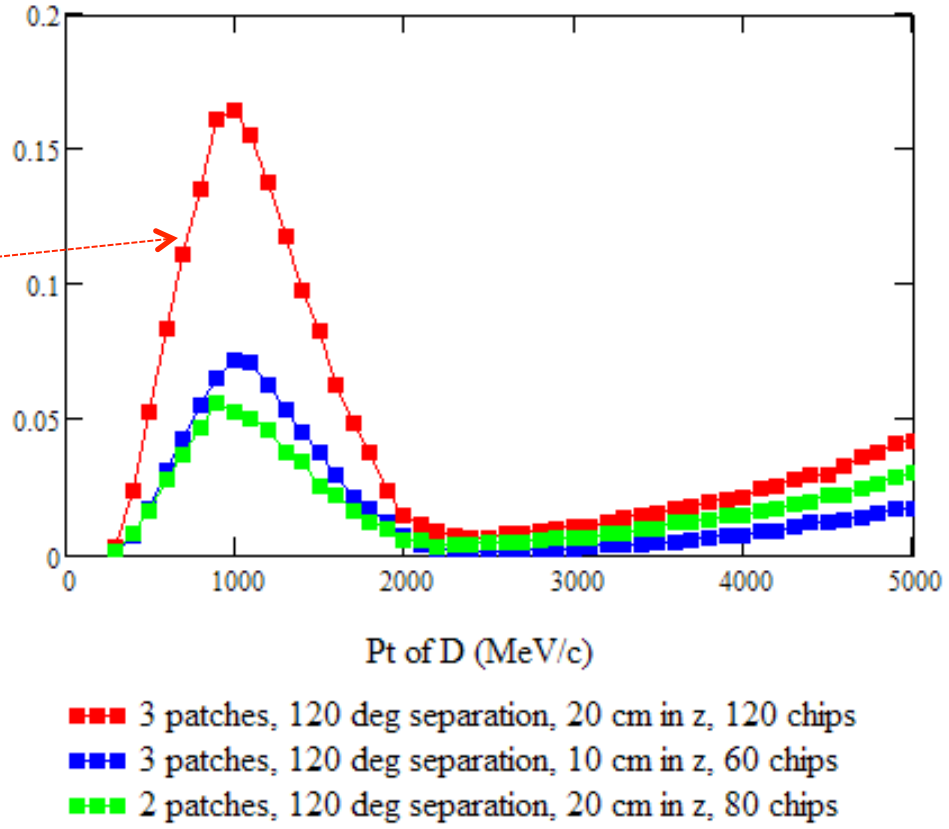
Good agreement given the slight differences

3-patch Pixel simulation, each covering 40 degrees



If the emission momentum vector of a daughter track falls in any angular cut then it is assumed as hitting the Pixels. Particle decays are included





Ratio of:

'All D0s with daughters that hit the patches' to

'All D0s with daughters in [eta<=1 and p>0.8]'

Remarkable agreement given that on the left we have included particle decays, TPC sector gaps and extra (# of hits) requirements