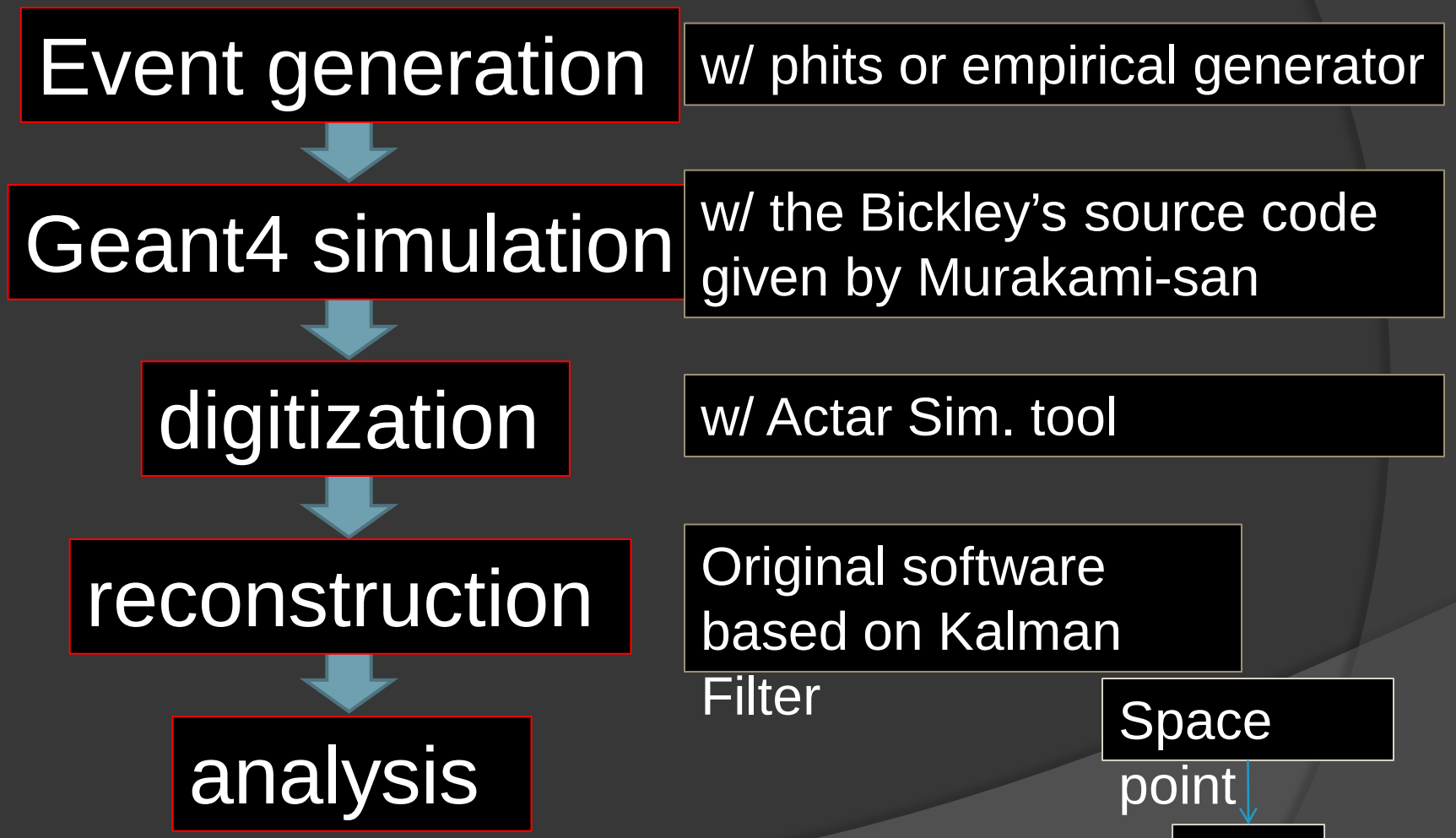
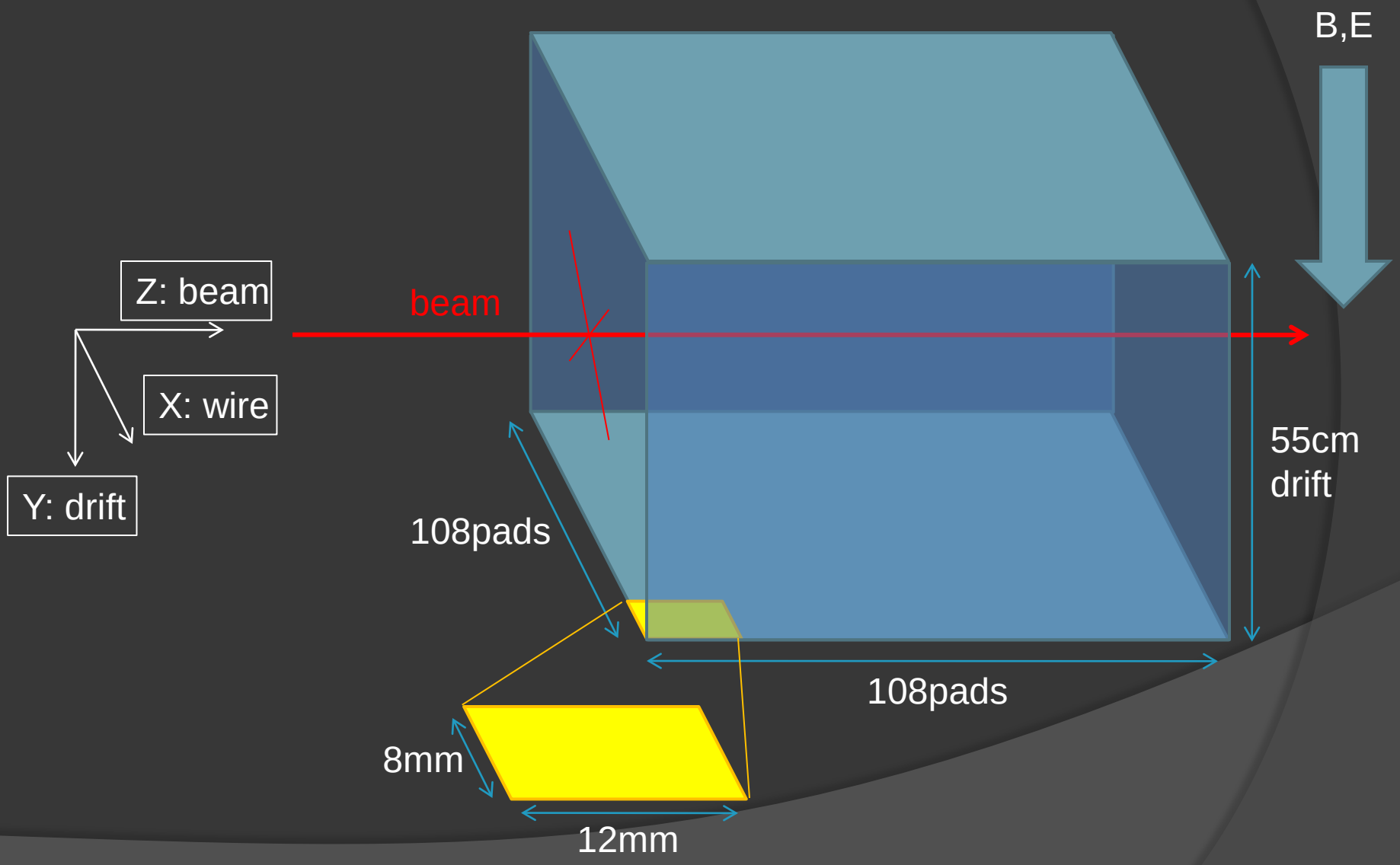
Simulation scheme

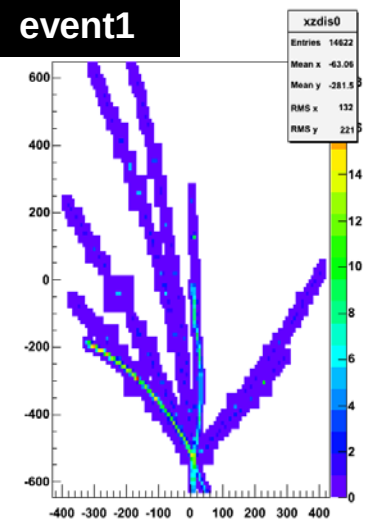


Geometry definition

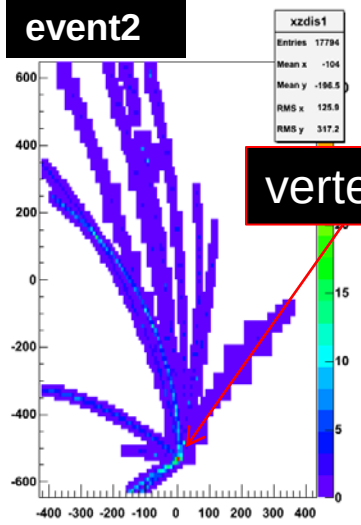


Digitization result projection of pad signal

event1

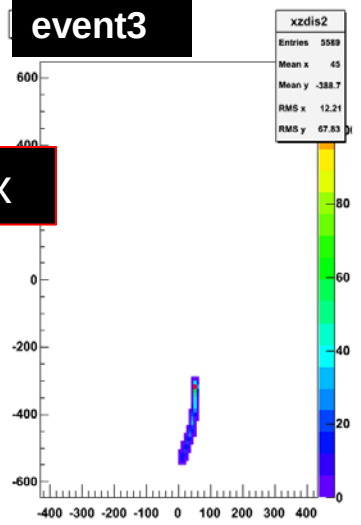


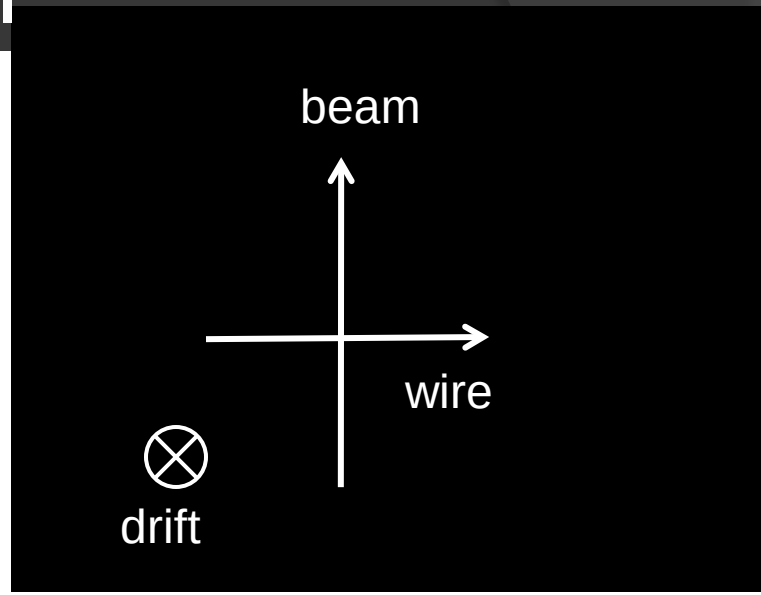
event2



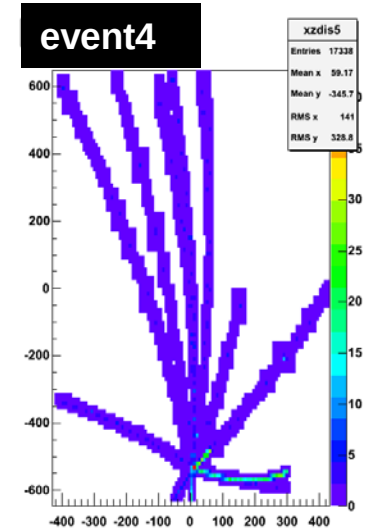
vertex

event3

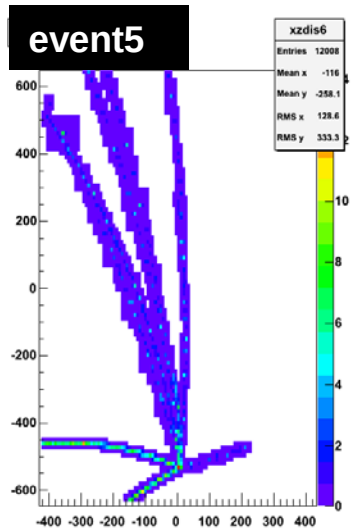




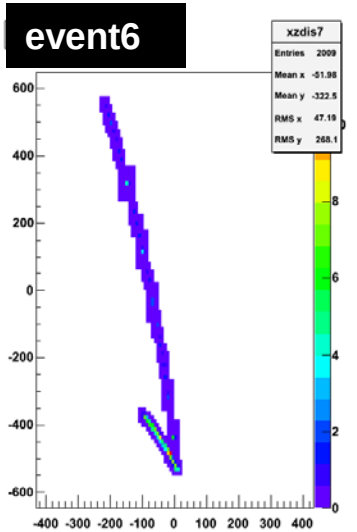
event4



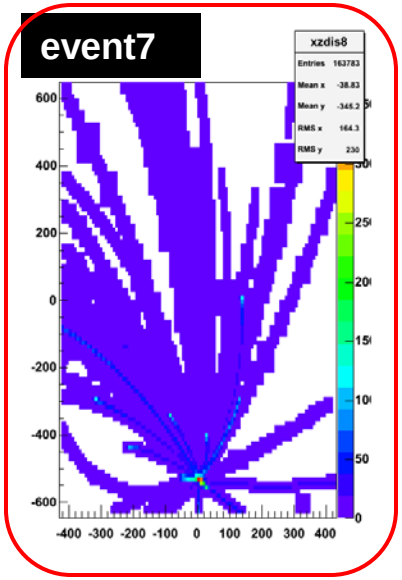
event5



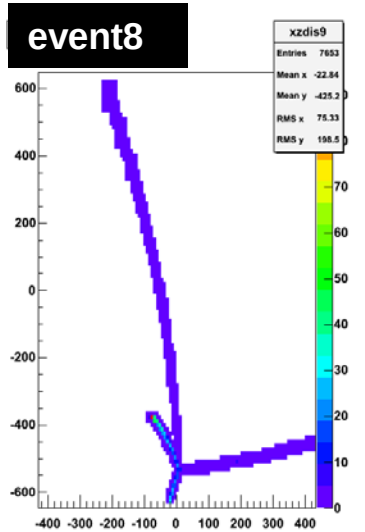
event6



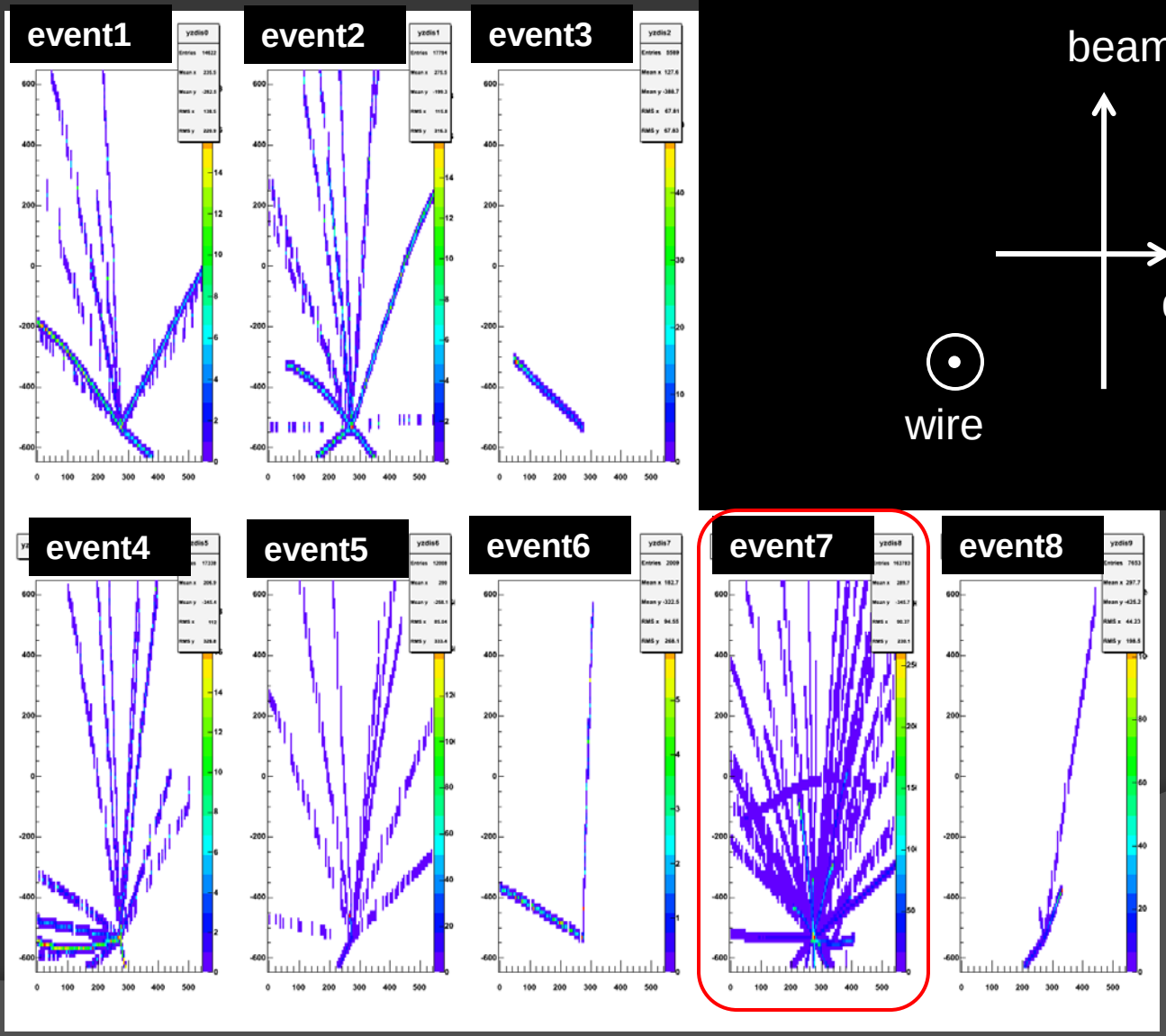
event7



event8



Digitization result
projection of pad signal



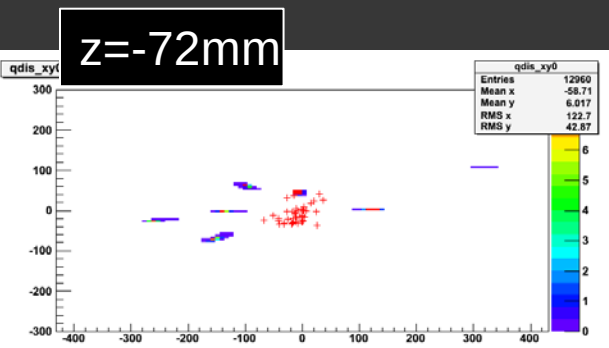
Space point reconstruction

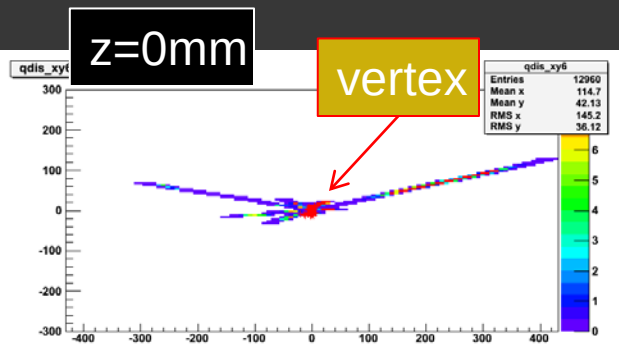
- Prior to track reconstruction, reconstruction of the space point where a charged particle crossed is necessary.
- The space point reconstruction is done for each layers. The layer is the plane perpendicular to beam axis.
- The algorithm itself is similar with cluster finding algorithm: finding the clusters whose charge is above tuned threshold.
- No noise is added currently and threshold is tuned to be small enough to pick pion signals.
- Continue finding the 2cm(wire axis)x2cm(drift axis) charge clusters until there is no charge above threshold.
- While there might be many noise clusters, such cluster can not be used for track reconstruction and I do not take such cluster seriously.

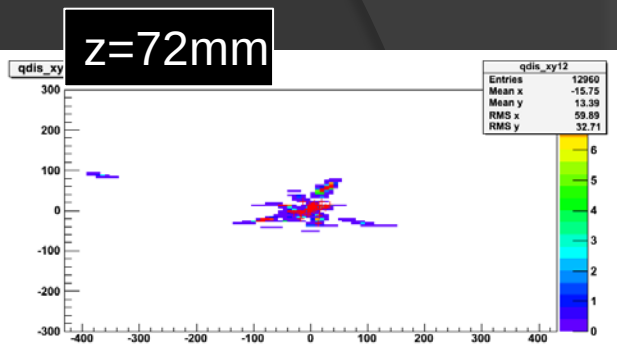
Track reconstruction

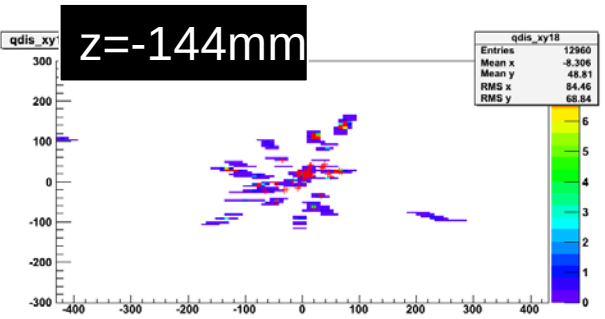
- I use the Kalman Filter package developed for tracking at ILC experiment.
- At first, I have to make track seed (track candidate).
- Scan the all of combination of two hits: one is from n^{th} layer and another is from $n/2^{th}$ layer ($20<=n<=108$).
- On the assumption of all of the track is from (0,0,0), one can estimate the track parameters for given seed.
- Try to find the corresponding hit which give small chi2 and reconstruct the track for given seed.
- If one track seed have more than 15 good hits, it is stored in track array.
- Currently, the used hits are no more used for other track reconstruction.

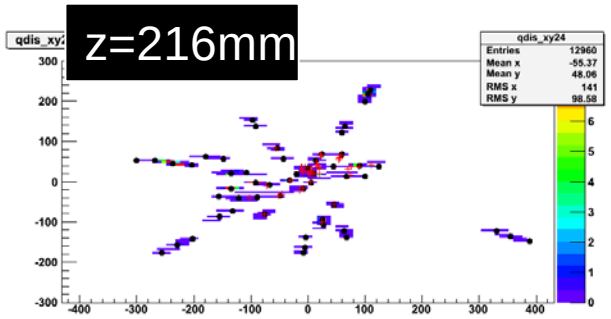
Tracking display for each layer

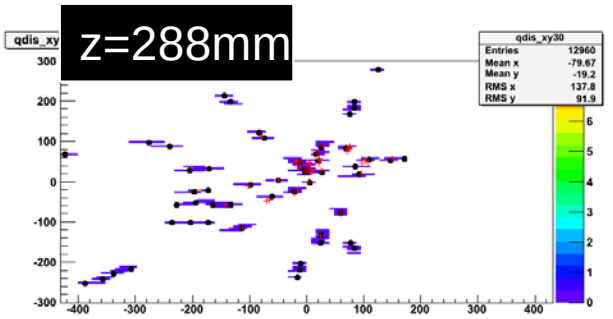


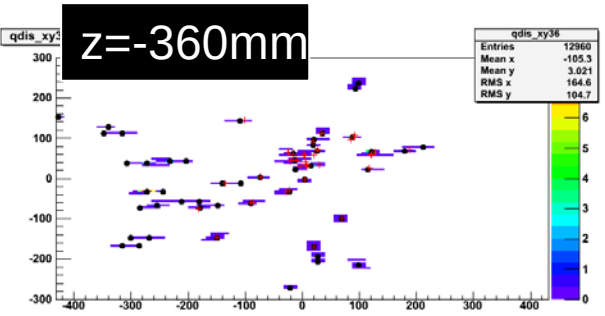


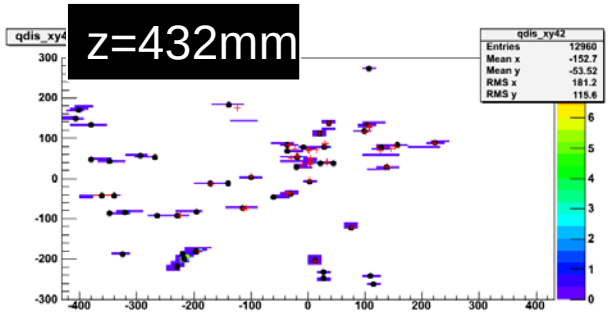


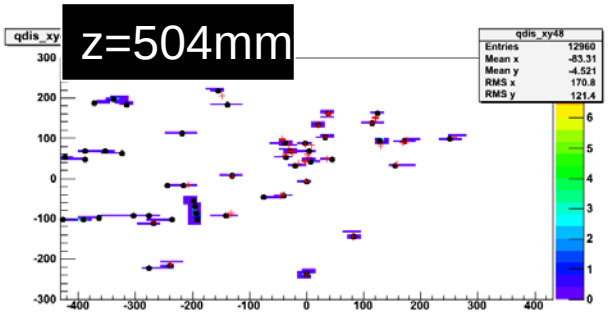




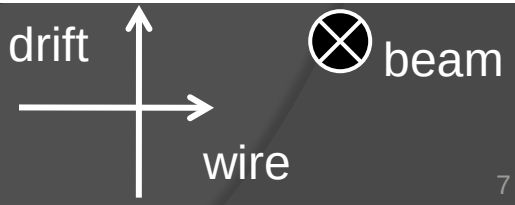






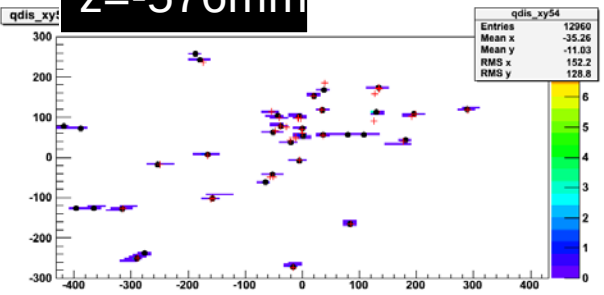


Colored squares: deposited charge
black circles: reconstructed hit position
red crosses: reconstructed track point

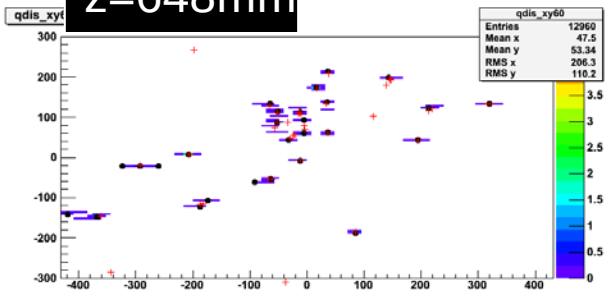


Tracking display for each layer

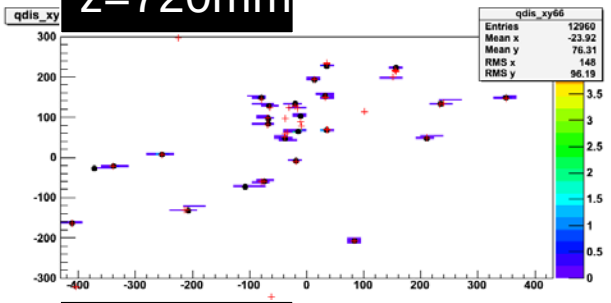
z=-576mm



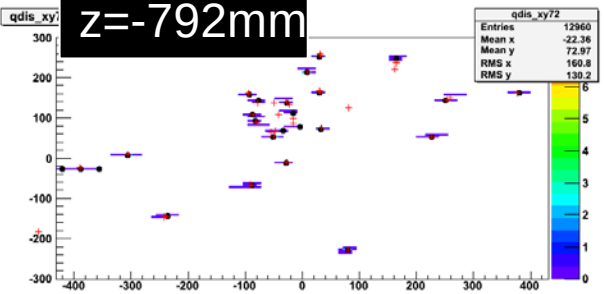
z=648mm



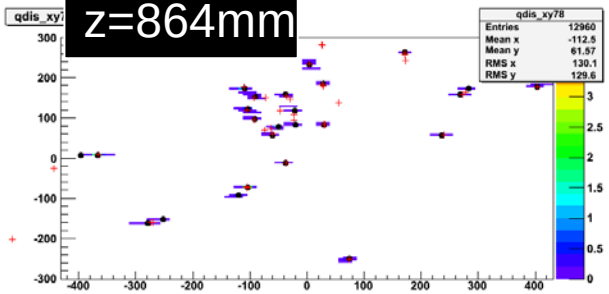
z=720mm



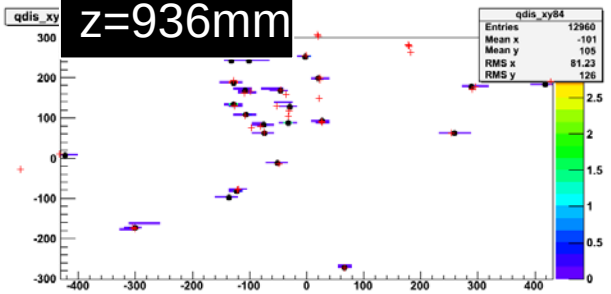
z=-792mm



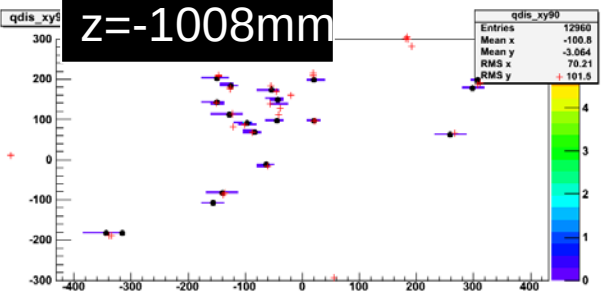
z=864mm



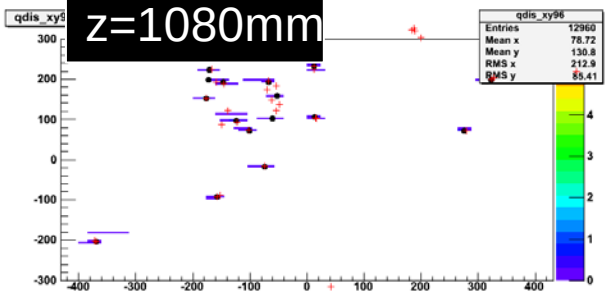
z=936mm



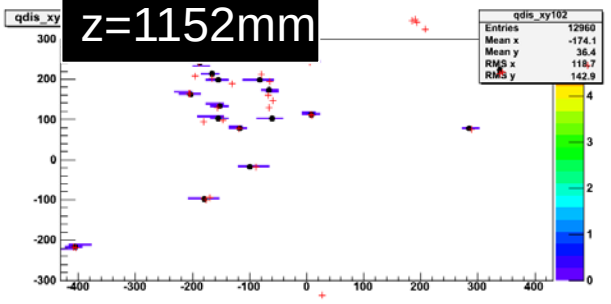
z=-1008mm



z=1080mm



z=1152mm



Colored squares: deposited charge
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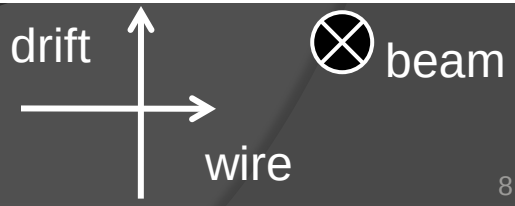
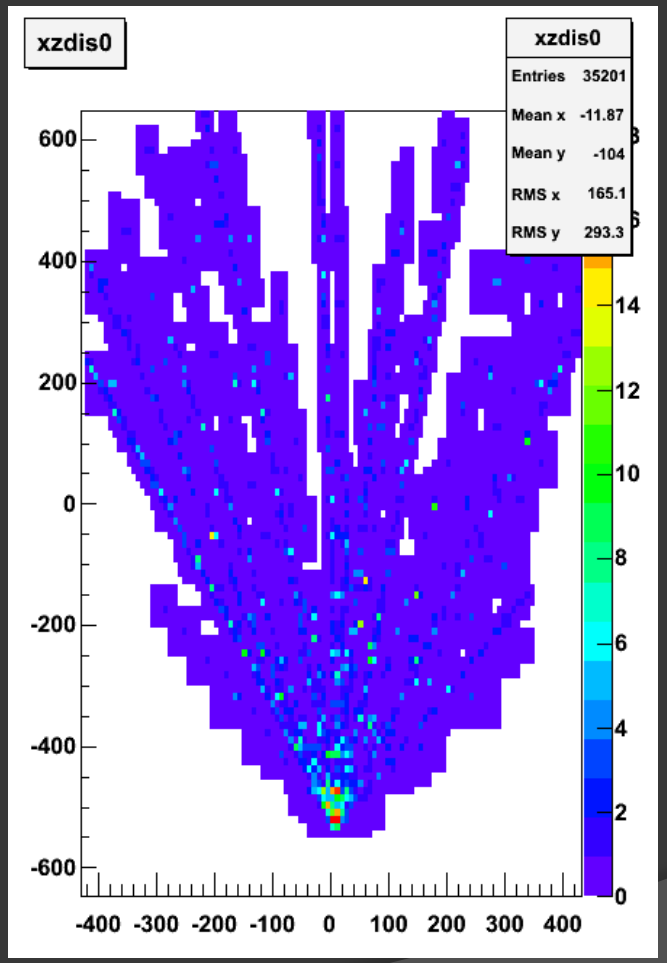
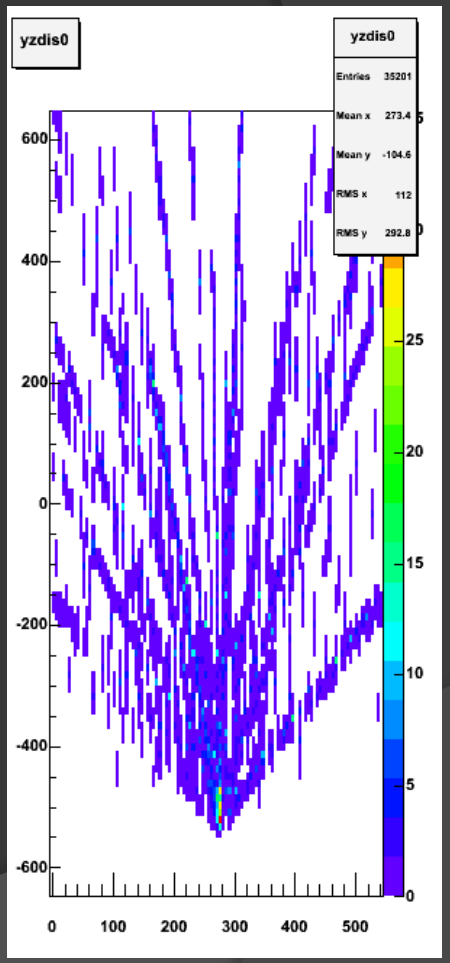


シミュレーションスタディ
central collision, digitized

- イベントGeneratorは原研で開発された原子核トランスポートシミュレーターPHITSを使用
  - JAM+JQMD
- GEANT4
- ガスのドリフト速度・拡散、エレキのsampling rateを考慮してdigitized dataをシミュレートした



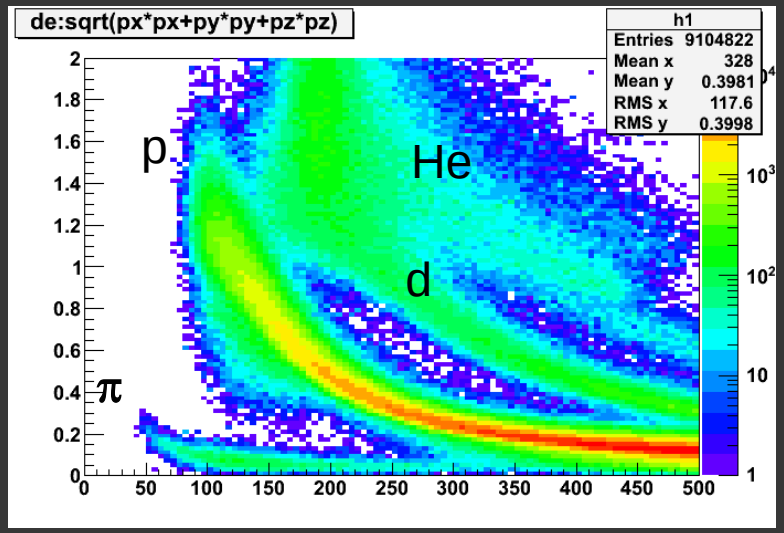


このスタディをベースにパッドのデザインを進めている

粒子同定 (運動量 vs dE/dX)

- 各再構成トラックにおける運動量・エネルギー損失相関をプロット
- 粒子高多重度イベントでパイオンIDが難しくなっている
- パイオン領域のS/Nを一つの指標にしてパッドデザインの変更を検討している

シングルトラック



Sn+Snミニマムバイアス