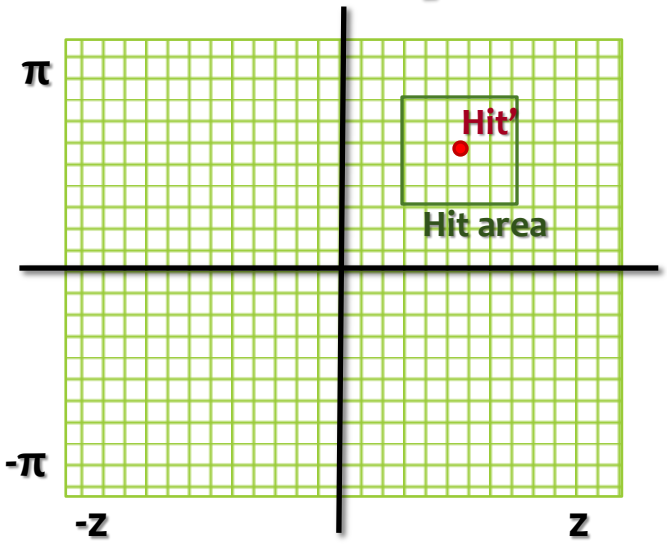
Status of HFT CA track finder. Grid

G.Kozlov, I.Kisel, M.Pugach, M.Zyzak

Grid implementation



- Grid is based on Z-coordinate and angle.
- Track finding direction – from outer station.
- Main steps of Grid usage:
  - Extrapolate hit -> hit' to the previous station in direction of PV;
  - Create Hit area around the hit' using ***dz*** and ***dα***;
  - Search for the next hit of the doublet inside Hit area.
- Number of bins in Grid depends on the number of hits on station.

Testing

- 5 events with pileup, 10 - ~150 tracks;
- Objective: optimal Hit area;
- Conditions: best efficiency, good calculation speed;
- Dependences:
  - (dz, dα) -> (efficiency, doublets calculation speed);
  - (number of doublets) -> (triplets calculation speed).

Calculation speed

With pileup

Average time of Grid filling: 12 ms/ev

Hit area (*dz; dα*)	Efficiency (%)		Doublets		Triplets	
	High p	Low p	Time (ms/ev)	Speed up	Time (ms/ev)	Speed up
No Grid	96.1	87.5	14000	-	790	-
(1.5; 0.1)	96.1	87.1	280	X50	660	X1.2
(1.5; 0.05)	98.0	85.6	88	X160	133	X6
(1.0; 0.05)	98.0	85.3	64	X220	131	X6
(0.5; 0.05)	90.2	82.5	37	X380	105	X7.5

Next step - vectorization

Angle cut is too strong for the low momentum tracks.

Good speed up of doublets calculation. Low speed of triplets calculation because doublets are not vectorized after Grid usage. Have to be repacked.

Plans

- Using big statistics for tests.
  - ***Request:*** *100 simulated events with pileup (+MC).*
- Vectorization of triplets calculation.
- Solving problem with angle around ±π.