

GPU Pixel Tracks at HLT: doublet generation

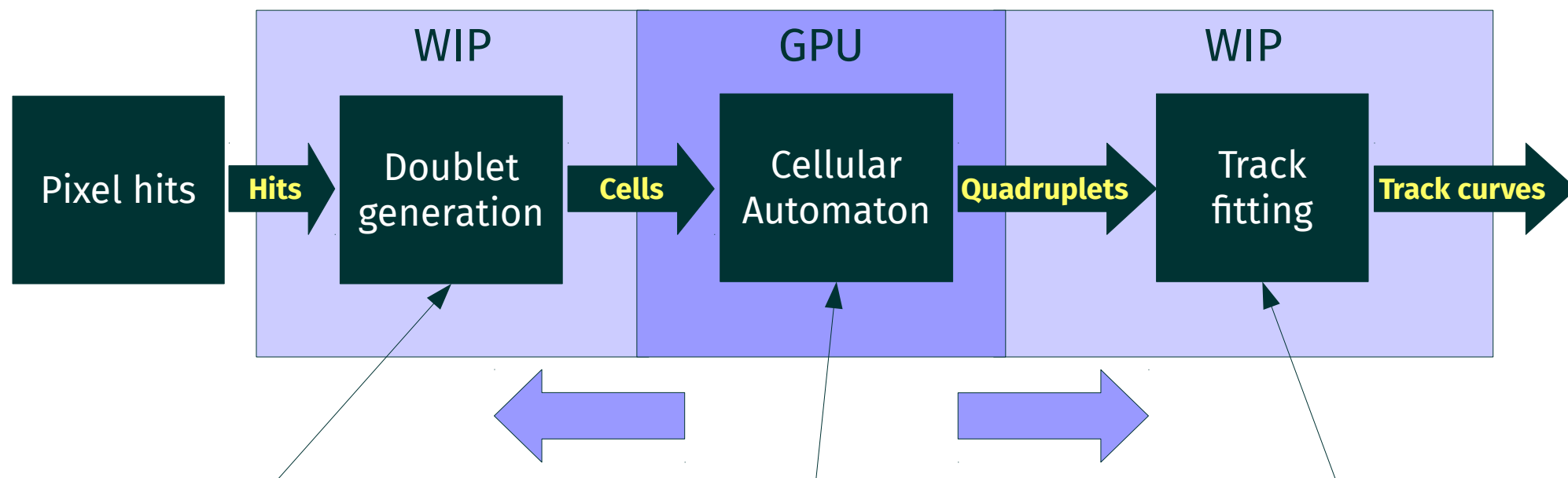
Status and plans

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Track generation



Doublet generation: hit pairs are filtered and candidate **track segments (cells)** between neighbour pixel layers are produced

The found hit doublets feed the **Cellular Automaton** which combines them to create hit quadruplets consistent with a track

The quadruplets are **fitted** to obtain a continuous track curve

- Once that existing algorithms have been ported to GPU, we will work on improving the existing code
- First **priority**: **filtering of hits on the inner layer**
 - \triangle r and z filtering is performed by checking every hit that has passed the φ selection \triangle
 - Poor performance with high hit density
- Two solutions have been suggested so far:
 - 1) **Splitting** the check between multiple threads
 - Re-uses the existing code
 - Can be implemented easily in short time
 - 2) **Pre-sorting** the hits in the r - z space using a **k -d tree** has been proposed
 - Trade-off in performance will be investigated
 - Might be vital in high pile-up environment

Backup

Doublet generation

Multithreaded implementation

- Each thread considers an outer hit in a layer pair:
 - It determines the φ , r and z range of the compatible hits in the inner layer
 - It filters the inner hits and creates doublets

