JÜLICH
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panda

Sketch of a Data Flow Concept

PANDA Meeting 2013 II (GSI)

25. June 2013 | Andreas Herten & Marius Mertens

Motivation

- Clear terminology / define names
  What is Global Tracking? What is a Burst? Online Event Filtering vs. Event Building?
- Clarify synonyms
  Software Trigger = Event Filtering?

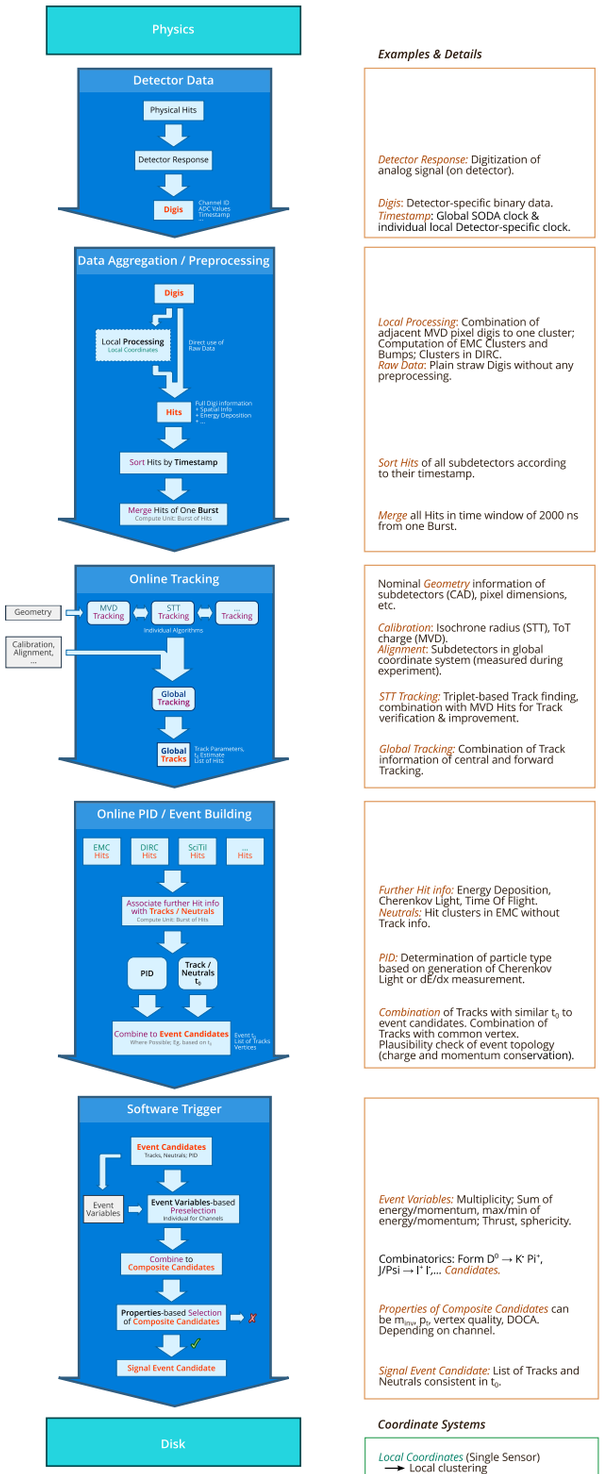
- Put steps and processes in context
  When does Timestamp Sorting happen? At which step is Alignment Information needed?
- Identify gaps & unclear points in current chain

- Provide diagram for presentations & wiki & …

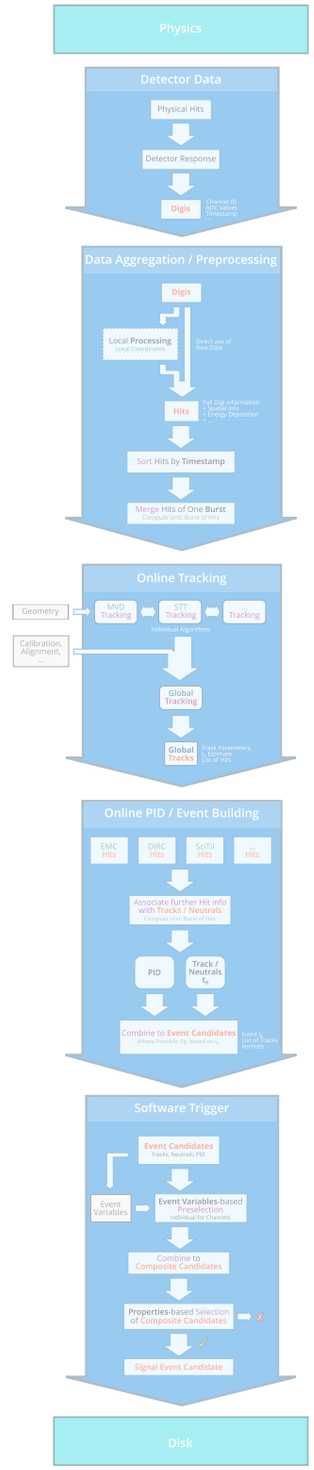
Data Flow Concept (Online)

- Stages covered
  - Detector Data
  - Data Aggregation / Preprocessing
  - Online Tracking
  - Online PID / Event Building
  - Software Trigger
- + Examples / Details

- Not covered:
  - Offline part
  - Inner structure of sub-stage boxes



Step By Step Run-Through



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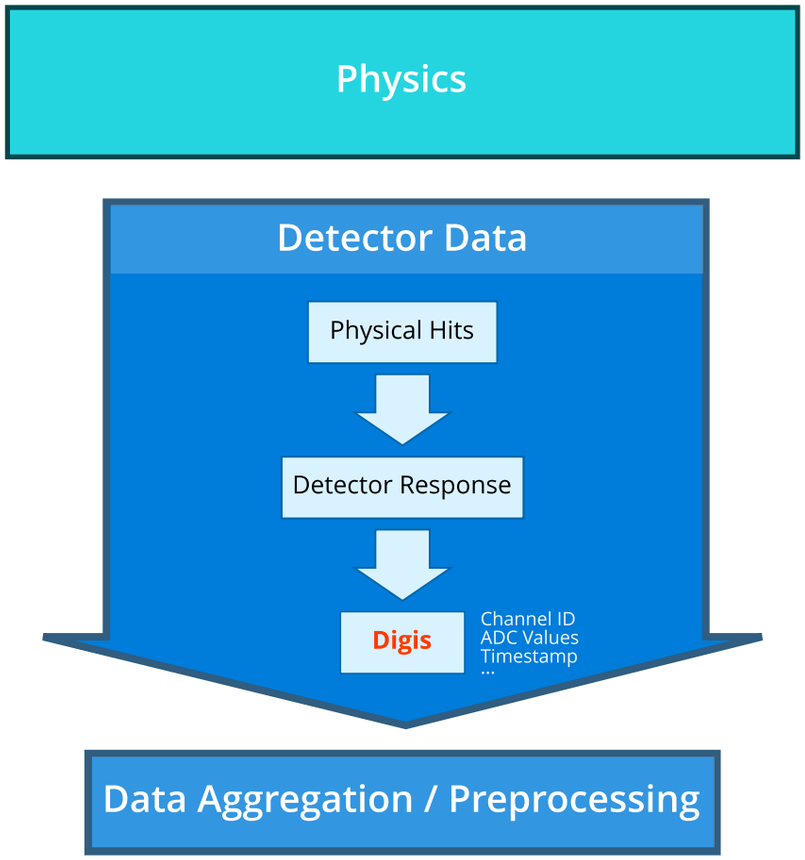
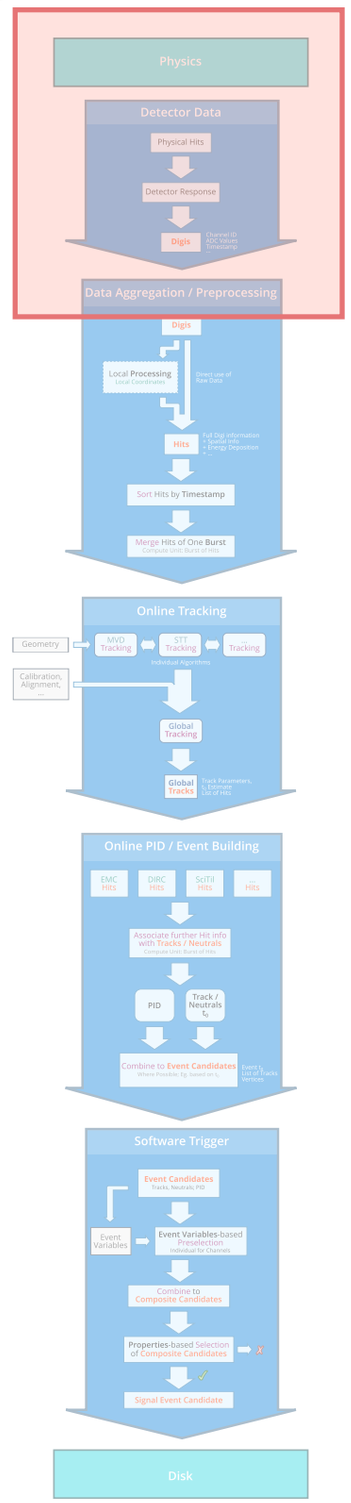


Examples & Details

Detector Response: Digitization of analog signal (on detector).

Digis: Detector-specific binary data.
Timestamp: Global SODA clock & individual local Detector-specific clock.



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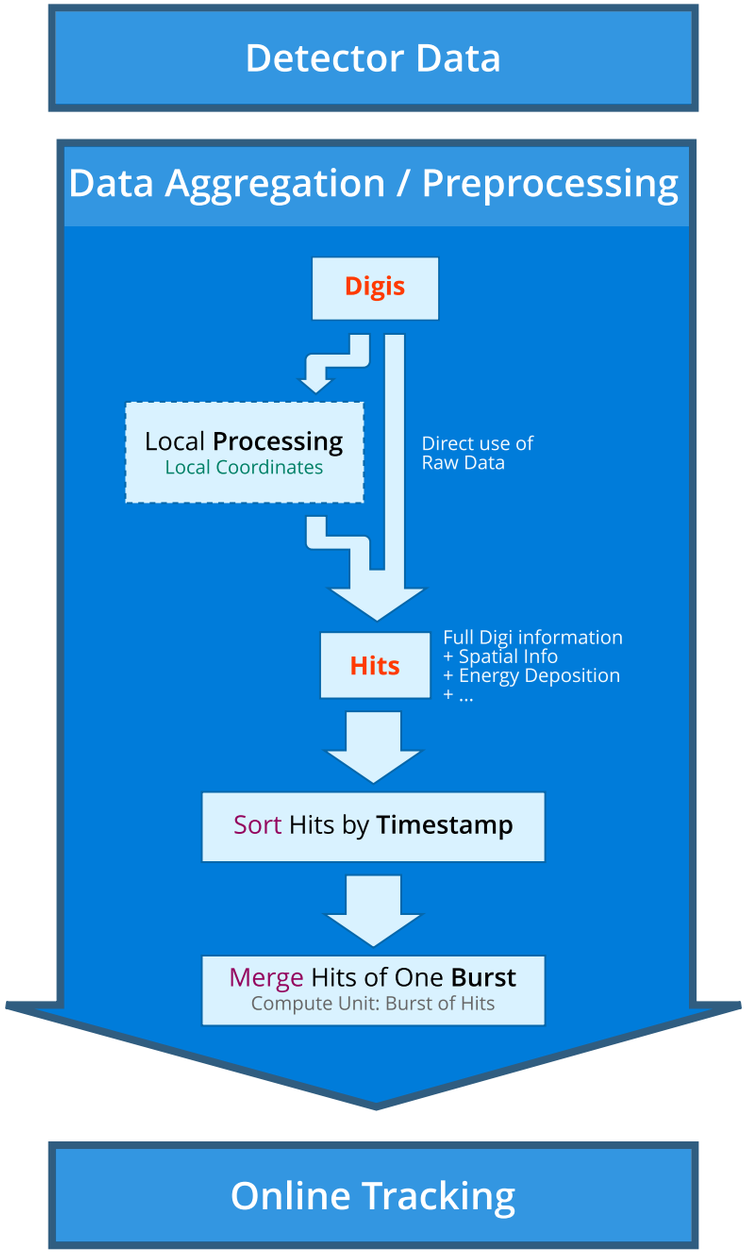
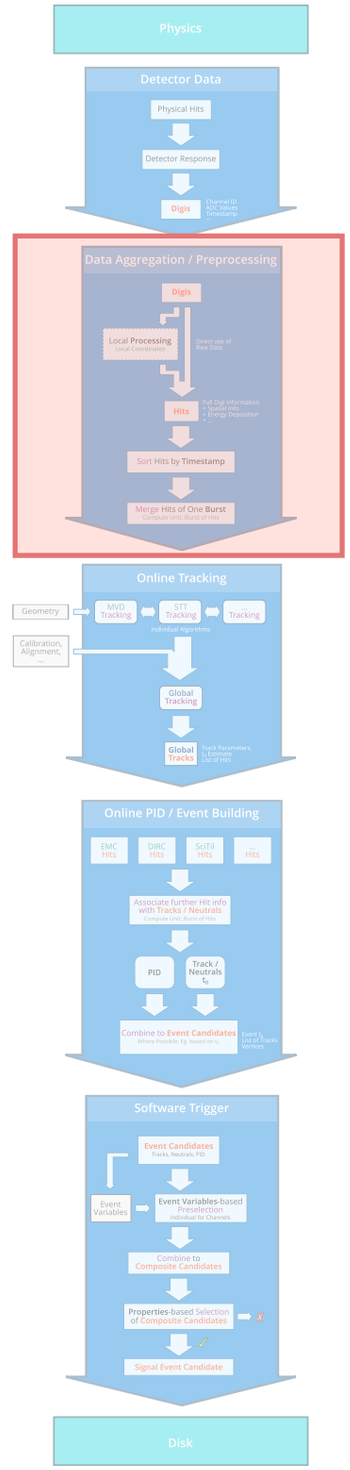


Local Processing: Combination of adjacent MVD pixel digis to one cluster; Computation of EMC Clusters and Bumps; Clusters in DIRC.
Raw Data: Plain straw Digis without any preprocessing.

Sort Hits of all subdetectors according to their timestamp.

Merge all Hits in time window of 2000 ns from one Burst.



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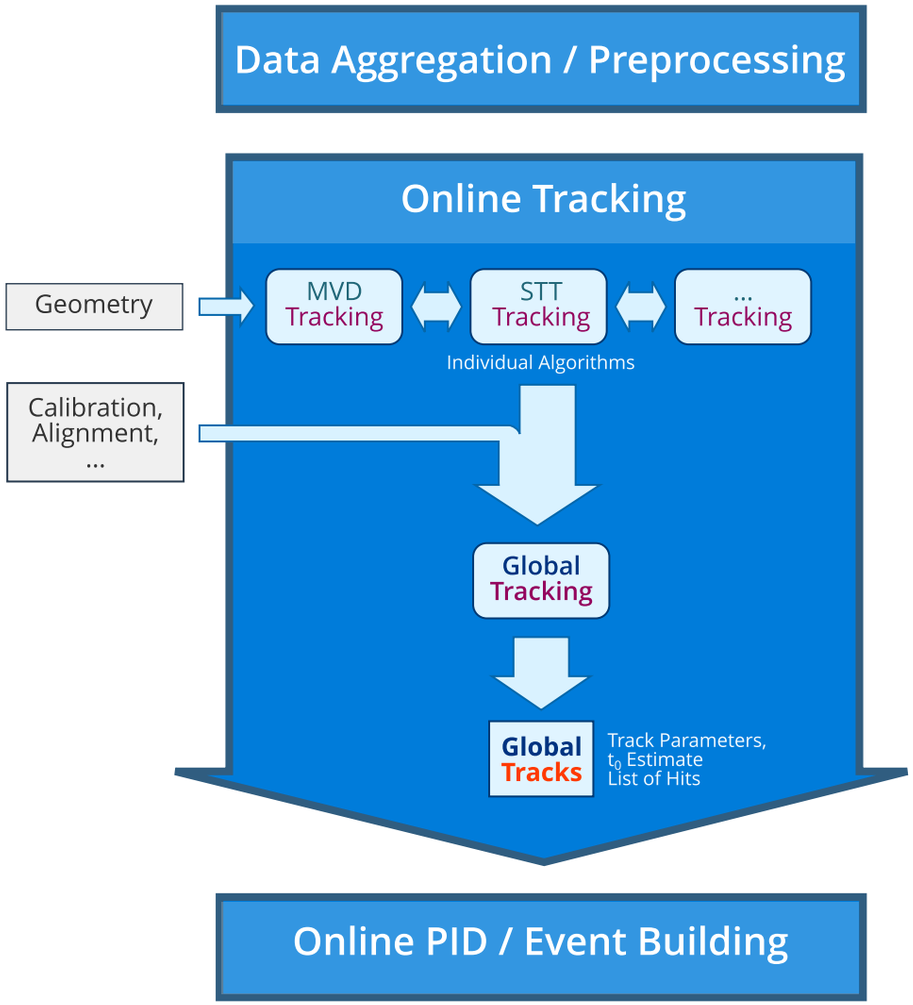
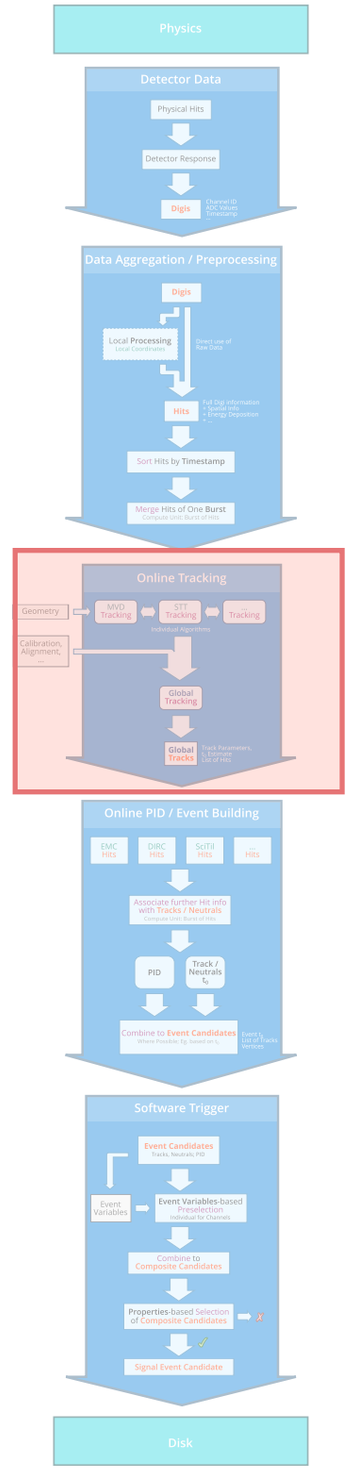


Nominal *Geometry* information of subdetectors (CAD), pixel dimensions, etc.

Calibration: Isochrone radius (STT), ToT charge (MVD).
Alignment: Subdetectors in global coordinate system (measured during experiment).

STT Tracking: Triplet-based Track finding, combination with MVD Hits for Track verification & improvement.

Global Tracking: Combination of Track information of central and forward Tracking.



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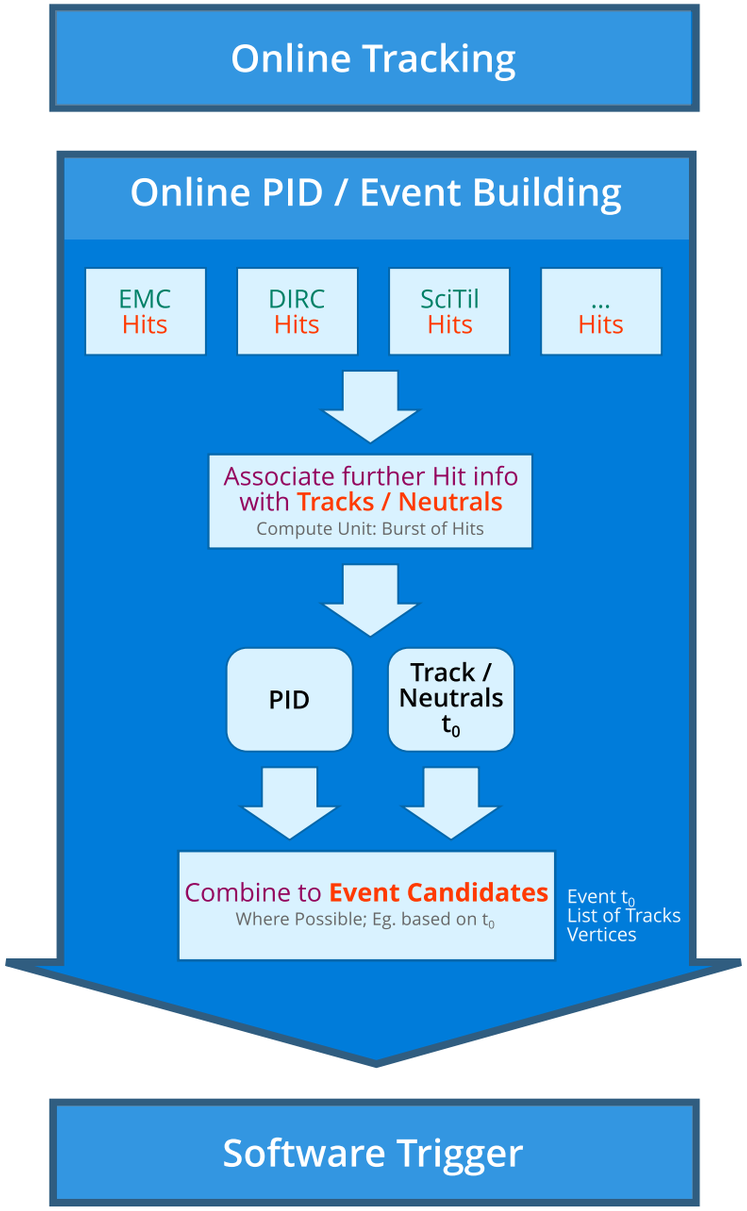
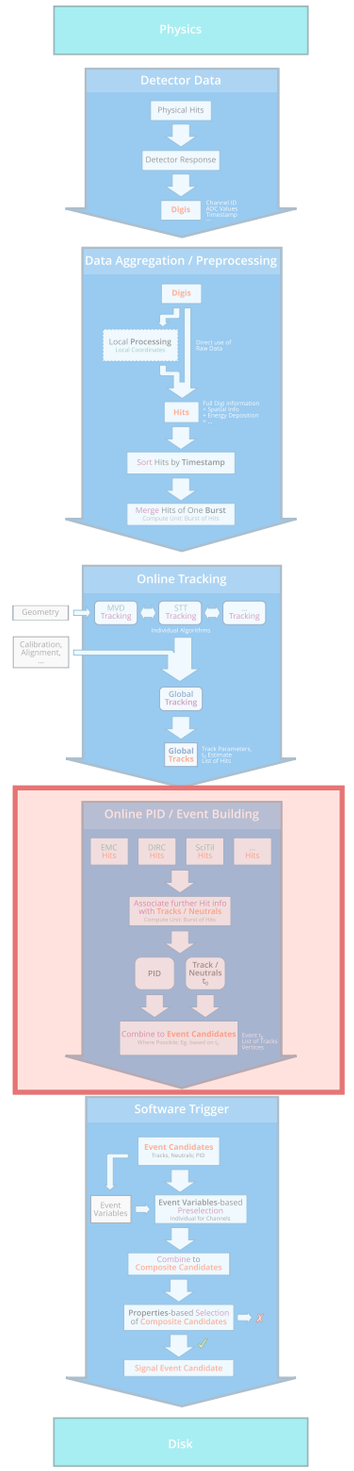


Further Hit info: Energy Deposition, Cherenkov Light, Time Of Flight.
Neutrals: Hit clusters in EMC without Track info.

PID: Determination of particle type based on generation of Cherenkov Light or dE/dx measurement.

Combination of Tracks with similar t_0 to event candidates. Combination of Tracks with common vertex.
Plausibility check of event topology (charge and momentum conservation).



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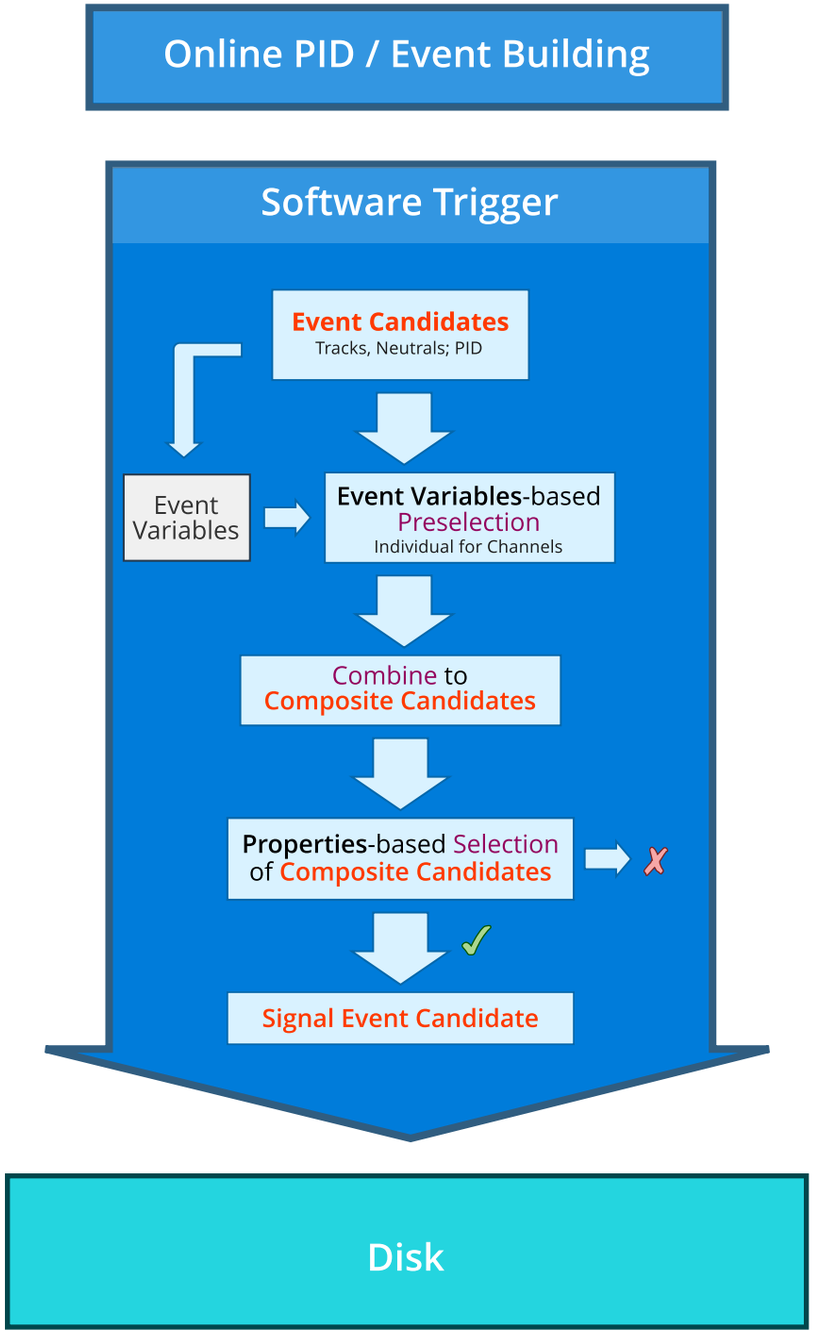
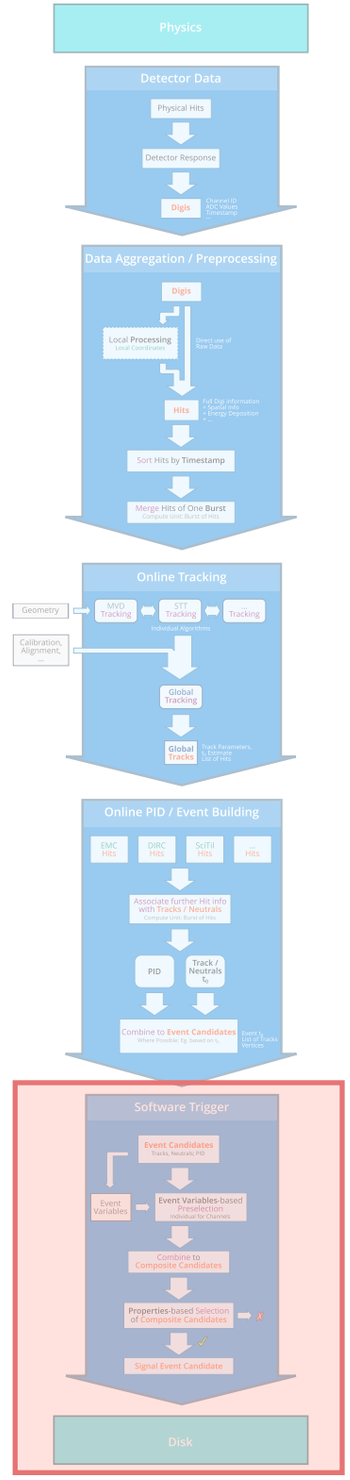


Event Variables: Multiplicity; Sum of energy/momentum, max/min of energy/momentum; Thrust, sphericity.

Combinatorics: Form $D^0 \rightarrow K^- Pi^+$, J/Psi $\rightarrow l^+ l^-$,... *Candidates.*

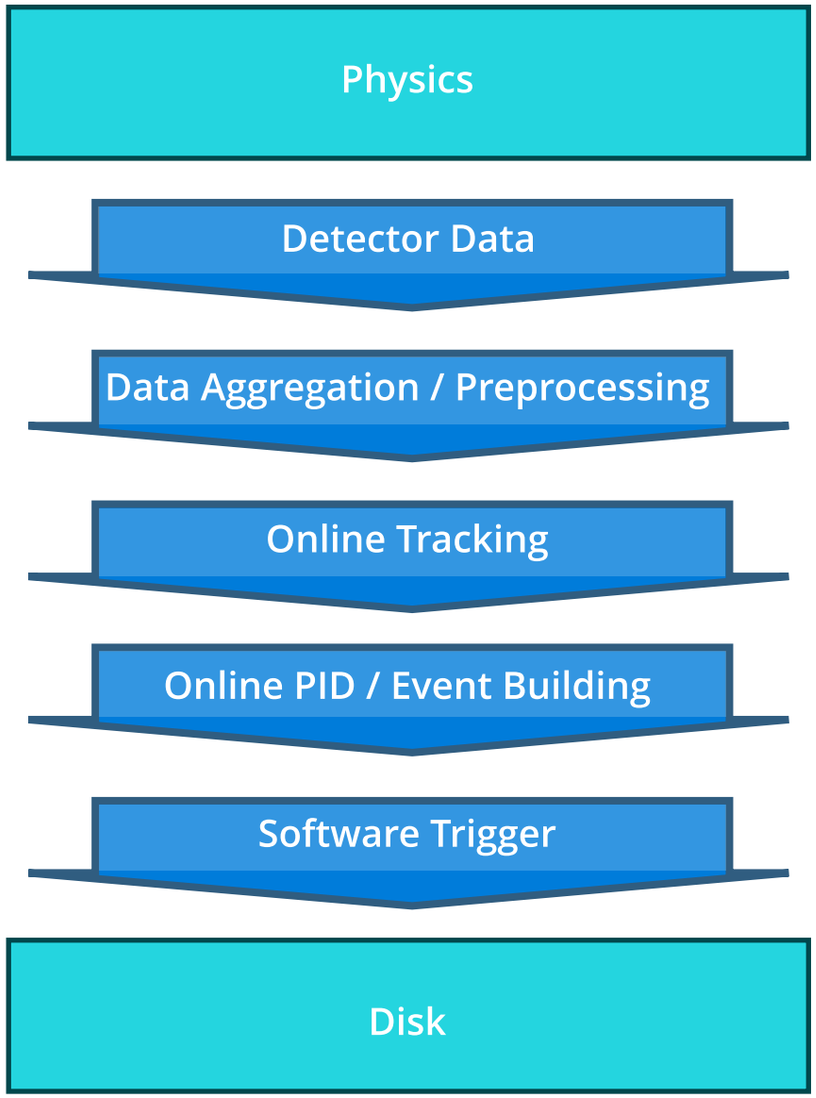
Properties of Composite Candidates can be m_{inv}, p_t, vertex quality, DOCA. Depending on channel.

Signal Event Candidate: List of Tracks and Neutrals consistent in t_0.



Summary

- 5 Stages from Physics to Disk
- Only Online!
  Might be extended to Offline
- Discussed with Klaus, Frank, Ralf & Donghee
  Thanks for your time and input!
- Upload to Wiki (/?)
  Use in your slides to put stuff in context
- **Input needed!**
  Maybe after session…



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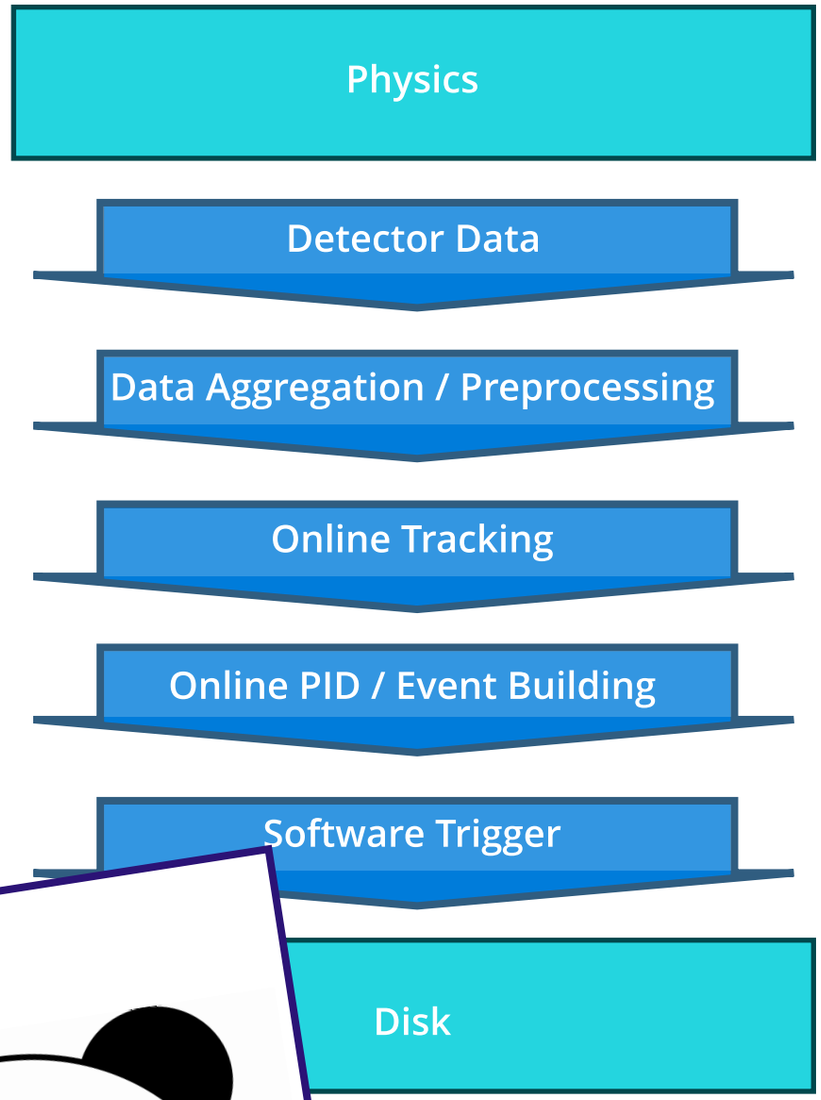

Appendix

Coordinate Systems

Coordinate Systems

Local Coordinates (Single Sensor)
→ Local clustering

Subdetector Coordinates (Module; Full MVD; Full STT; ...)
→ Subdetector local tracking

Global Coordinates (Full PANDA)
→ Tracking with several subdetectors combined