Belle-II Event Display

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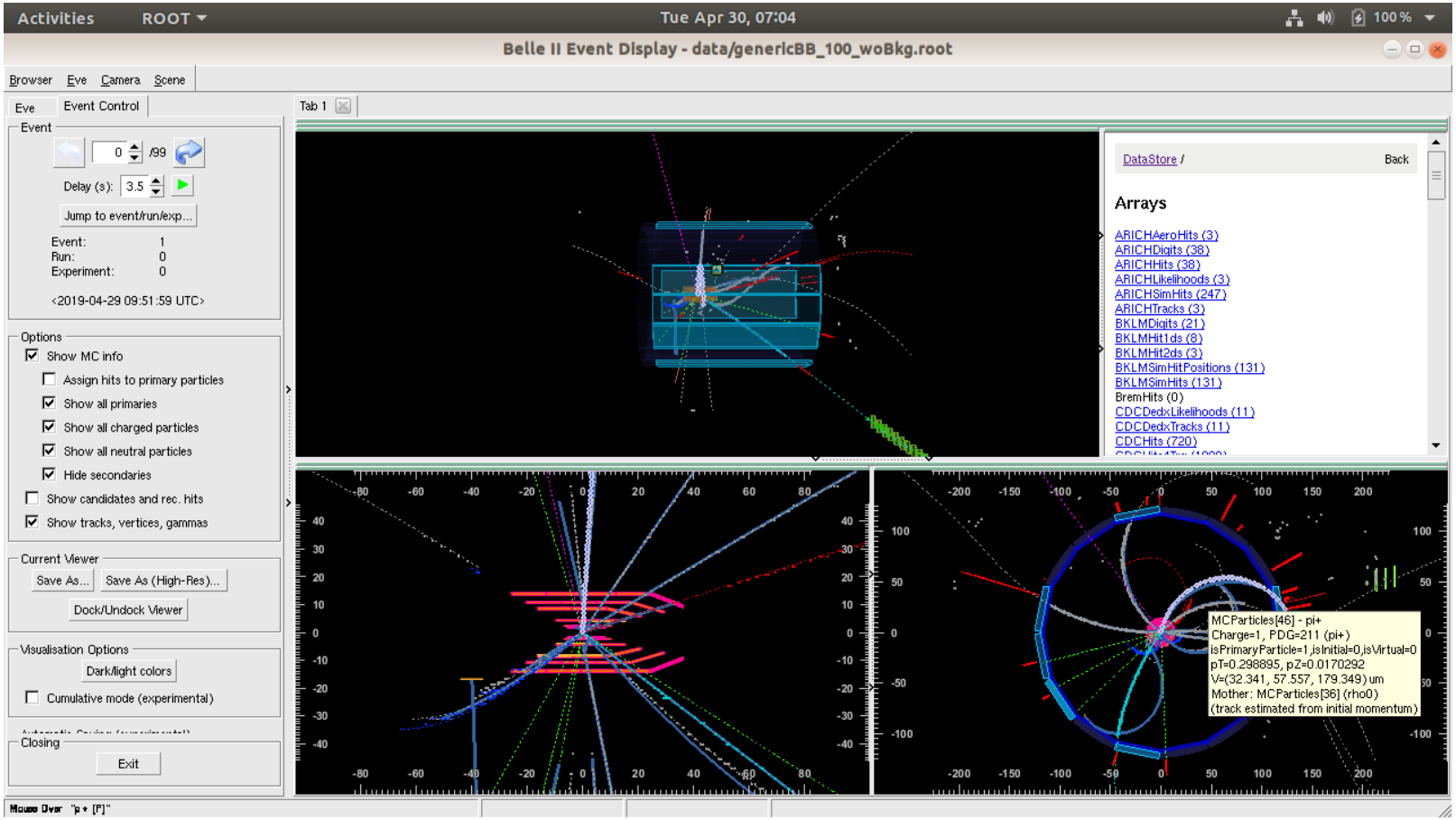
für Bildung
und Forschung

Whats an Event Display

- tool to display events
- takes as input root files in the Belle-II data format (real or simulated data)
- uses the Belle-II geometry to translate these data into a graphical representation of what is going on in one event (collision)
- comes (for free) with installation of the Belle-II software (basf2)
- shown is a much simplified representation of the Belle-II detector (full geometry is possible but currently bugged)

How does (should) it look



What can be seen

Monte Carlo Information (only for MC data)

- true information on all particles created by the generator
- true trajectory through detector
- true identity (particle type) and true mother

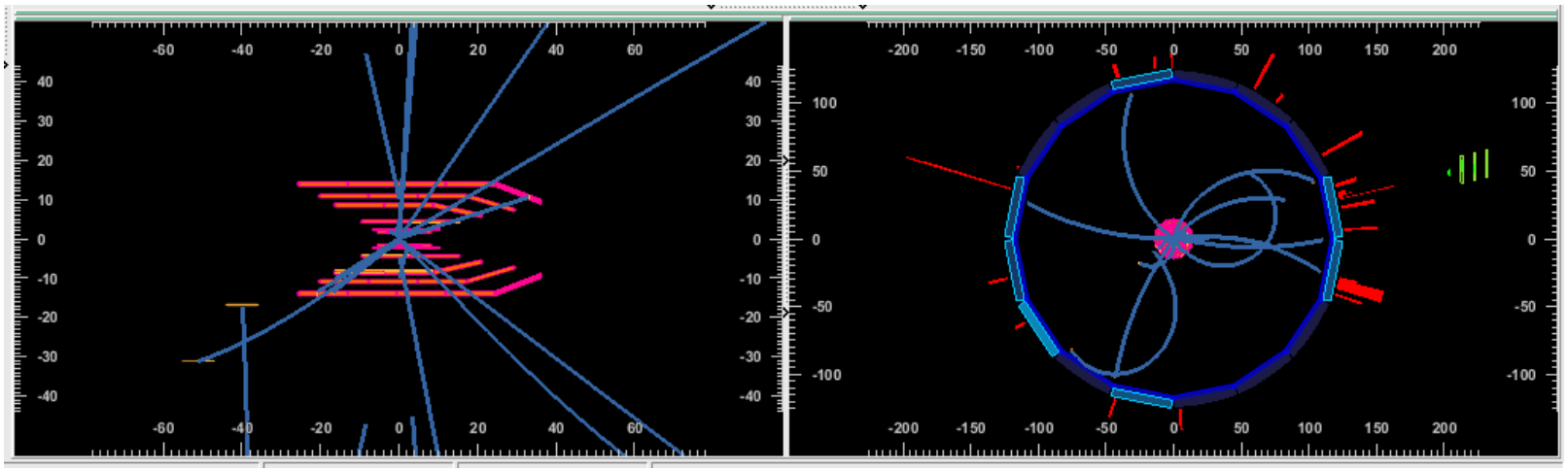
Detector level information (if written out)

- hits for most of the sub-detectors
- hit positions

Reconstructed quantities

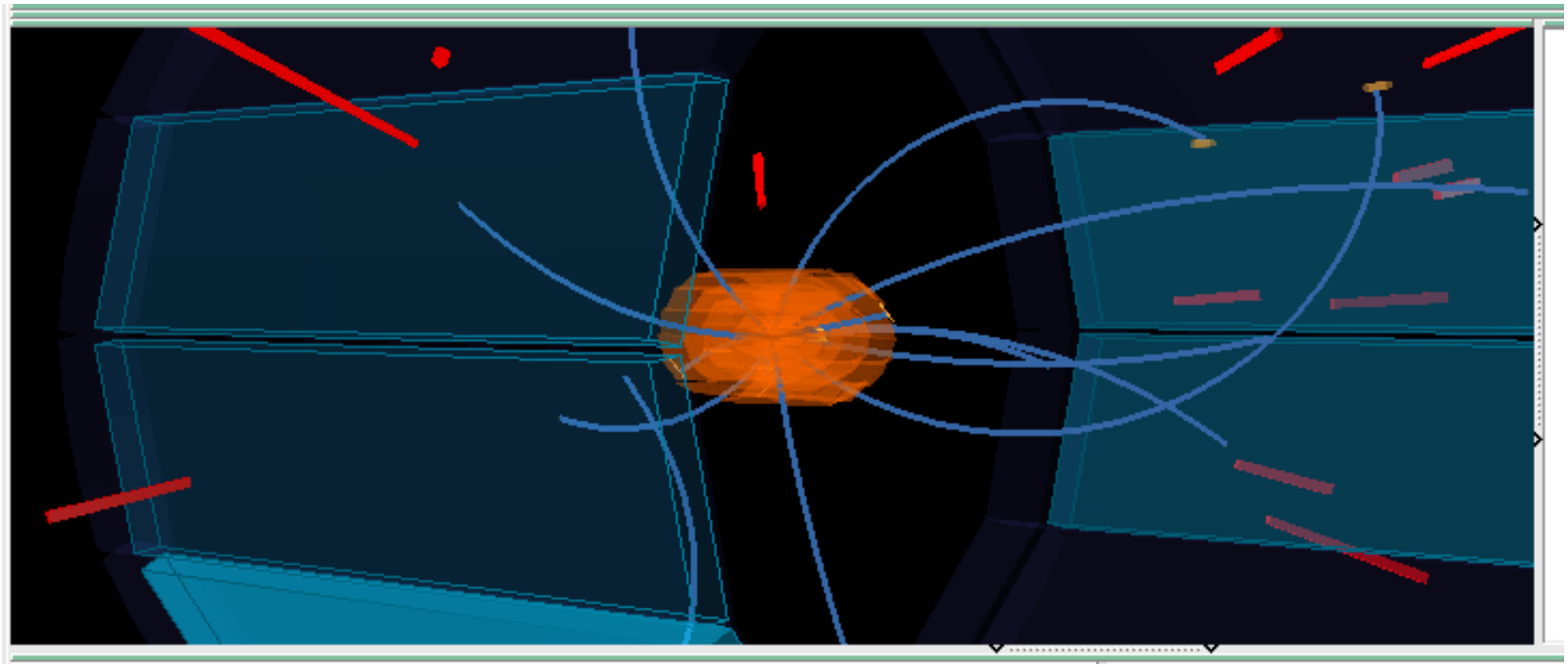
- reconstructed tracks (combination of hits in the tracking detectors)
- reconstructed clusters (combination of ECL crystals)
- KLM clusters
- ...

Different views: projections in x-y- and y-z-plane



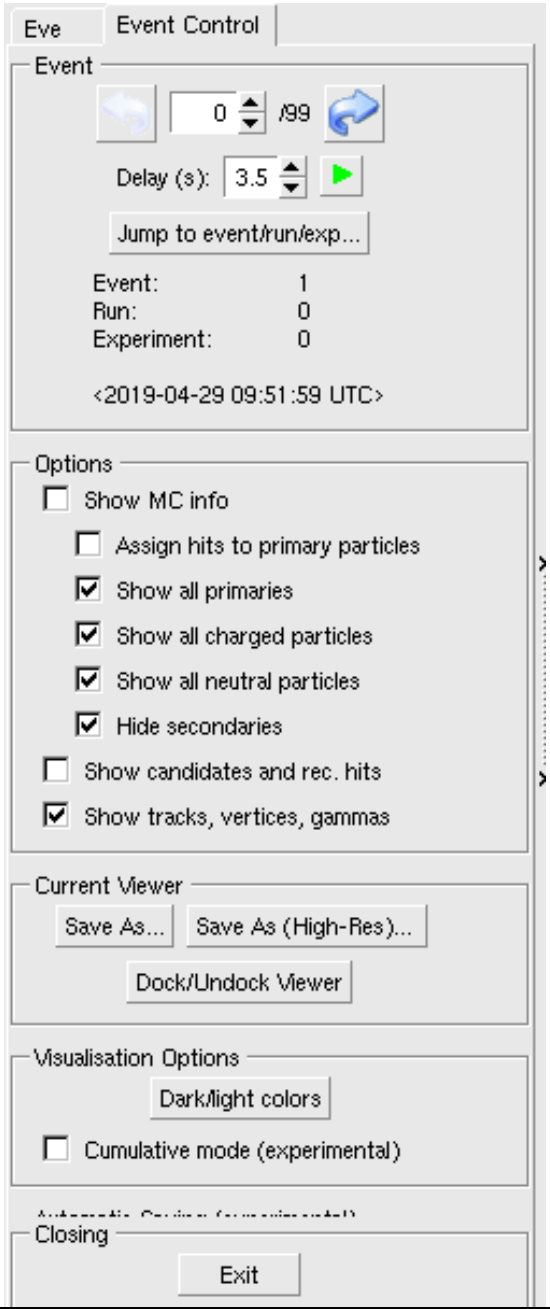
- zoom: mouse scroll; or hold right mouse button + move mouse
- moving image: arrow keys

Different views: full 3D view



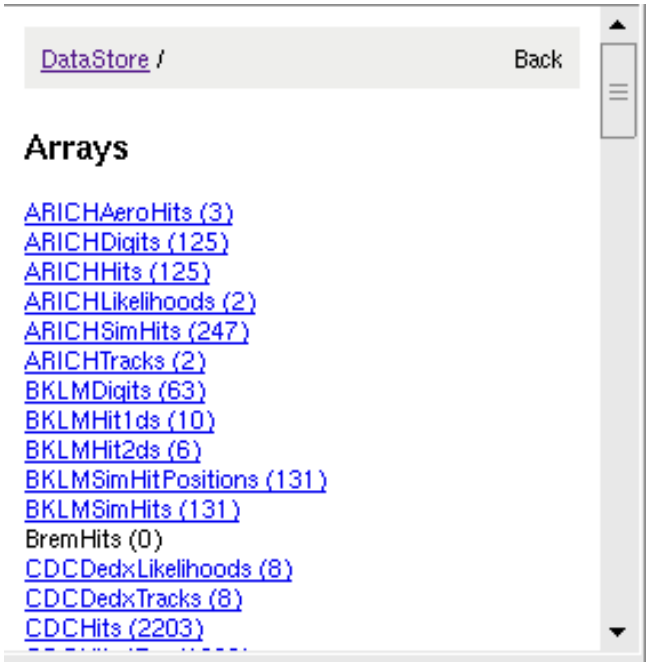
- zoom: mouse scroll; or hold right mouse button + move mouse
- moving image: arrow keys
- rotate image: hold left mouse button + move mouse

Event steering



- go one event back / forward
- play all events as a movie (can adjust time between events)
- activate or deactivate certain kinds of information
- save screen shots for events

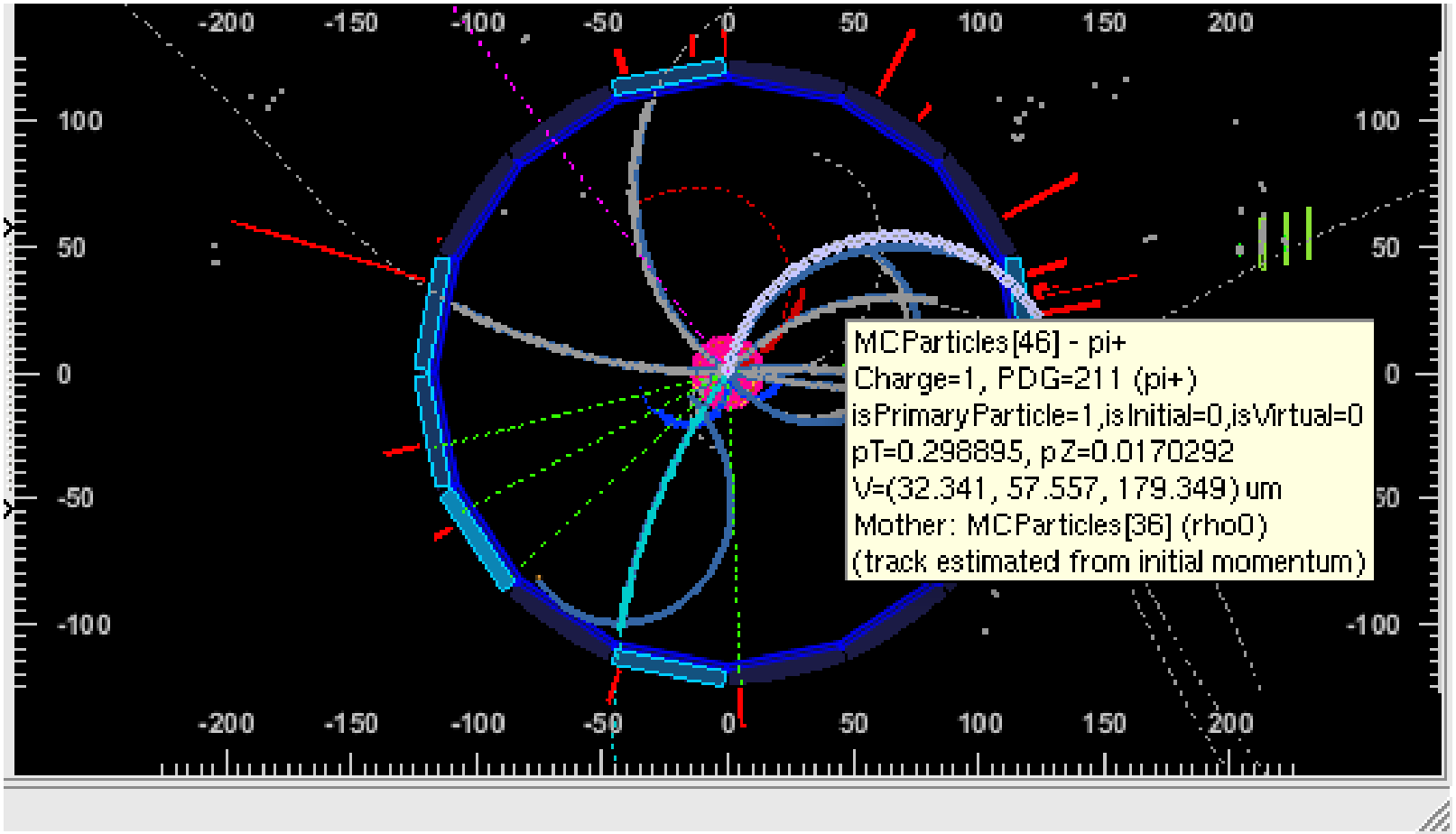
List of objects



- complete list of all objects or arrays of objects in the event (reconstructed and generated)
- click on specific objects to get more information

Final tip:

- hover mouse over certain objects to get more information on said object
- object will be highlighted in all views



Generated different types of events (100 per file)

- $e^+e^- \to B\bar{B}$
  - B mesons decay generically: into all allowed/known final states
  - two versions: one with (w), one without (wo) beam induced background
  - activate "Show candidates and rec. hits" (if you dare) and see if you can spot the difference
  - files: genericBB_100_woBkg.root; genericBB_100_wBkg.root
- $e^+e^- \to c\bar{c}$
  - pair of c-quarks produced which hadronize into the final state
  - more boosted compared to $B\bar{B}$ events
  - similar for lighter quarks: $e^+e^- \to s\bar{s}$; $e^+e^- \to u\bar{u}$; $e^+e^- \to d\bar{d}$
  - file: ccbar.root
- radiative Bhabha events: $e^+e^- \to e^+e^-\gamma$
  - very large cross section compared to $B\bar{B}$ events
  - easy to reject due to event topology (2 charged tracks)
  - mainly at low scattering angles
  - file: rad_bhabha.root

Generated different types of events (100 per file)

- $e^+e^- \rightarrow \mu^+\mu^-$
  - 2 charged tracks (back to back in CMS)
  - file: mumu.root
- $e^+e^- \rightarrow \tau^+\tau^-$
  - also quite boosted event topology
  - more particles in the final state compared to $e^+e^- \rightarrow \mu^+\mu^-$ $e^+e^- \rightarrow e^+e^-$
  - file: tautau.root

Summary

- you cannot break anything, so toy around
- If you have any question: Ask!
- Have fun!