Beam Backgrounds + Tracking

Work to be done and studied

Open points of workshop

Tracking Workshop: https://indico.cern.ch/event/1516157/timetable/?view=standard

Discussion doc: https://tinyurl.com/FCCTrackerBNL2025

Main points to takeaway (in view of this discussion)

- General need to study geometry tracker and VTX
- Magnetic field: 1-2-3 T?
- Requirements on timing (more important for PID with Si tracker?)

Some ideas presented here

VTX: https://indico.cern.ch/event/1516157/contributions/6444597/attachments/3063226/5417358/BNL%20workshop%202025%20-%20Vertex%20issues.pdf

Tracking (gaseous): https://indico.cern.ch/event/1516157/contributions/6444601/attachments/3063615/5418242/BedeschiBNL25_DCHdiscussion.pdf

Open points of workshop – Tracking in general

Geometry of tracker and VTX (Delphes)

- Inner/outer radii of tracker
- Inner/outer radii of vertex (vtx already studied partially)
  - Optimize layers, especially inner (MDI constraints) and outer (coupling with tracker)
  - Long barrel vs. barrel + endcaps
  - Angular acceptance, discussion on cos(theta) < 0.99 vs 0.98? Impact?
- Silicon wrapper: required resolution?
- Study tracking performance (also impact on physics e.g. Higgs mass?)
- But also PID performance (e.g. smaller drift chamber has impact on dN/dx)

Magnetic field (Delphes)

- Study effects of 1-2-3 T magnetic field: (forward) acceptance vs. momentum resolution, hadronic/B/tau (low momentum tracks)
- Low B field at Z pole, high B field at ZH? Seems possible to run
- Try to quantify physics metric

Beam backgrounds and i

Focus on IPC (GuineaPig) and radiative Bhabha (BBBRem + GuineaPig)

- IPC can be reproduced (OK)
- Bhabha not yet – work ongoing (interfacing with GP)
- Should be integrated in the central DIRAC framework for event generation

Individual studies on IPC to be done (Standalone)

- Crossing angle, detector field implementation
- Overlap beam backgrounds with physics: manual vs. overlapping module (validation needed) → requires to know the integration times of detectors (important for drift, not for VTX?)

Revise Detector occupancy (FullSim)

- Done at simhit level (Nate et al.)
- First implementation of digitizer available – some validation necessary still
  - Revise occupancy after digitization
  - Interpretation of occupancy with detector readout
- Optimize VTX layers position w.r.t. beam backgrounds