Physics Background Simulation for PXD

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- ▶ several important aspects: Occupancy, Radiation Damage, Data reduction scheme
- ▶ currently 4 step process: Generation (see C. Kiesling talk), Filtering, Merging, Simulation

Simulation of physics background for the PXD

2. Filtering
   - read hepevt-files
   - cut events without any particle in the acceptance range
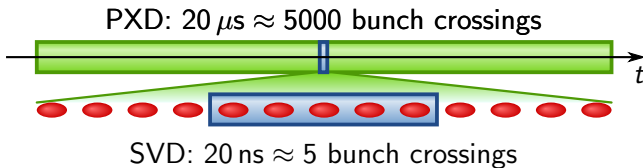
Standard Cuts

$$17\,^{\circ} \leq \theta \leq 150\,^{\circ} \qquad \text{and} \qquad p_t \geq 5\,\text{MeV}$$

   - optional: boost events

Standard Boost

EHER $= 7\,$GeV, ELER $= 4\,$GeV, crossing angle $= 83\,$mrad

   - write remaining events to file
   - calculate adjusted cross section

Simulation of physics background for the PXD

PXD: 20 μs $\approx$ 5000 bunch crossings

SVD: 20 ns $\approx$ 5 bunch crossings

3. Merging
   - calculate mean number of events per crossing μ
   - for each crossing with timestamp t_c, $t_c = 0$ at center read *poisson*(μ) random events from hepevt file
     - gaussian smearing of vertex by current design bunch size
     - gaussian smearing of t_c by bunch length/c
     - optional: boost events
     - optional: cut on acceptance
   - write merged events to file for simulation

Simulation of physics background for the PXD

4. Simulation
   - Simulate events using ILC Mokka/Marlin tool-chain
   - Mokka modified to allow input of specific vertices and timing information
   - SVD/PXD-Digitizer modified to allow specification of time-windows: all hits outside specified time-window will be ignored
   - Simulation ready, needs testing

Conclusions

- Generation under evaluation using various generators.
- Filtering and Merging implemented, currently under testing
- Simulation ready, currently testing