SVD Geometry and Simulation

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Outline

1. Overview
2. Geometry and alignment
3. The Digitizer
4. Background studies
5. Development plans

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Overview and current status

- **Geometry**
  - Basic implementation in place, but some features absent or only coarse
  - Basic implementation of alignment parameters
  - For some time now, out of sync with current changes in SVD design
- **Digitizer**
  - Under test: background studies, simple (testbeam-like) geometry. Lorentz angle effects not working properly: error in the code.
  - Timing still the main challenge towards a realistic simulation: can develop later, but critical for occupancy estimates.
- **Background study**
  - Currently in progress, more detailed info at the Bkg meeting
  - Outdated geometry painful, but not a major problem for dose estimates
  - Occupancy estimates still with a question mark.

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Geometry and alignment

- **Basic implementation in place**
  - Some features only rudimentary or completely absent (chips, cooling pipes).
  - OK to implement when design stabilizes? The simulation geometry has to be somewhat coarser due to performance considerations.
- **Out-of-sync with current design changes**
  - A substantial part of the geometry is now out-of-date.
  - Need a correct geometry without overlaps for simulation.
  - For some current features, this is hard to achieve.
- **An updating schedule is needed**
  - What is the maximum acceptable distance between actual and simulation geometry
  - Adding missing features vs. keeping the simulation geometry simple enough to get valid geometry more easily.
- **Alignment**
  - We have a place (.xml file) where to write alignment corrections to geometry parameters, and a mechanism to use them in geometry creation.

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The Digitizer

- **Recent modifications:**
  - Corrected error in Lorentz angle calculation
  - Introduced a “floating” time window to correctly account for out-of-sync background.
- **Done**
  - Processing logic made similar to PXD digitizer – except timing.
  - Improved debugging output to a ROOT file
  - Improved SVDDigit format
- **Question marks**
  - Simulation is now also out-of-sync with SVD development: Need different approach to simulate things like p-stops.
  - Similar to PXD digitizer: *we need a detailed map of electric fields within silicon*.
- **Plans:**
  - Timing
  - Validation
  - Ghost hits

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Background studies

- **Current status:**
  - Analyzing 100 μs background sample generated by Nakayama-san. Larger sample, more types of background.
  - Developed a background analysis module, off-line digitization for occupancies.
  - More precise neutron fluxes (correct calculation of 1 MeV equivalent), reasonable occupancies.
  - Belle computer unavailable.
- **Expectations**
  - Data for all important background sources
  - Better neutron fluxes (correct 1 MeV equivalents)
  - Better occupancies
  - First results at the Bkg meeting
  - More detailed data by end of February

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Development plans

- **Geometry:**
  - Implement a more recent valid version of the geometry
  - Provide an option for alternative geometries
- **Digitizer**
  - Commit...
  - Timing logic
  - Improve simulation to get in touch with current developments
  - Things for longer term: Ghost hits, error matrices for SVDHits etc.
- **Background studies:**
  - Preliminaries at Bkg meeting this week
  - Detailed results for B2GM
  - Background analysis module to basf2 svn.

Thank you for attention!