

# SVD Simulation: Digitizer and Clustering

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# Outline

1. Overview
2. Geometry
3. Digitizer & Clusterizer
4. Background studies
5. Development plans



# Overview and current status

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## □ **Geometry**

- Basic implementation in place, but some features absent or only coarse
- Basic implementation of alignment parameters
- Out of sync with current changes in SVD design

## □ **Digitizer & Clusterizer**

- Under test: background studies, simple (testbeam-like) geometries.
- Lorentz angle problem solved.
- 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- Outdated geometry not a major problem for dose estimates
- Occupancy estimates in focus.



# Geometry and alignment

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- **Basic implementation in place**
  - Some features only rudimentary or completely absent (chips, cooling pipes).
  - More details 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  - A substantial part of the geometry is now out-of-date.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. Tricky to achieve at this stage.
- **An updating schedule is needed**
  - Keep acceptable distance between actual and simulation geometry
  - Adding missing features vs. keeping the simulation geometry simple enough to get valid geometry more easily.
- **Alignment**
  - Same as for PXD: We have a place (.xml file) where to write alignment corrections to geometry parameters, and a mechanism to use them in geometry creation.



# Digitizer & Clusterizer

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### ▫ **Recent modifications:**

- Corrected error in Lorentz angle calculation

### ▫ **Done**

- Processing logic made similar to PXD digitizer – except timing.
- Improved SVDDigit format

### ▫ **Question marks**

- SVD data format (aka SVDDigit): Inspiration in Belle.
- 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.*
- Find adequate representation of timing in the SVD.

### ▫ **Plans:**

- Timing: simulate (equivalent of) waveform data, proper clustering in time
- Validation with testbeam data
- Ghost hits: Delegate handling to the tracker (credits to Moritz). Meaning: Create 1D SVDHits and SVDRecoHits. (There will be 2D TrueHits, anyway).



# Background studies

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## ▫ **Current status:**

- Analyzing 100  $\mu$ s background sample generated by Nakayama-san. Larger sample, more types of background.
- Developed a background analysis module, off-line digitization for occupancies.
- Belle computer unavailable.

## ▫ **Expectations**

- Data for a larger set of background sources
- Better neutron fluxes (correct 1 MeV equivalents)
- Better occupancies
- First results at the Bkg meeting
- More detailed data by end of February



# Development plans

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### ▫ **Geometry:**

- Get in sync with design development
- 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 BPAC / B2GM
- SVD background analysis module to basf2 svn.



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**Thank you for attention!**