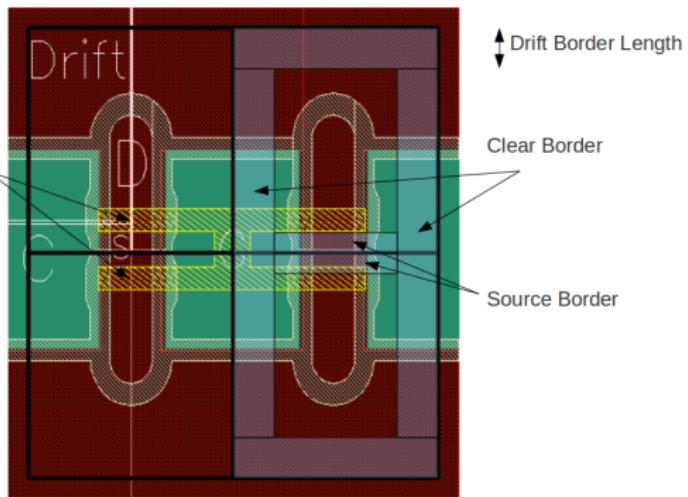


Calibration of PXDDigitizer

- compute label probabilities for reference data
- generate some data with similar beam conditions, geometry, etc.
- use χ^2 -minimization to fit calibration constants
- validate constants with clustercharge and clustersize distributions

Fitting variables:

- ▶ gQ
- ▶ SourceDrainBorder
- ▶ ClearBorder



χ^2 -minimization

Minimize cost function:

$$F(\vec{x}) = \frac{1}{2} \sum_i \rho(f_i(\vec{x})^2)$$

- ▶ x : n-dimensional vector of fitting variables
- ▶ $f(\vec{x})$: m-dimensional vector of residuals
- ▶ $f_i(\vec{x}) = p_{i,\text{ref}} - p_{i,\text{gen}}$: residual of i-th label
- ▶ $\rho(z) = 2 \cdot (\sqrt{1+z} - 1)$ or $\rho(z) = z$: loss function

simulated reference data

200k events with:

- ▶ $gQ = 1.0 \text{ nA/e}$
- ▶ $\text{SourceDrainBorder} = 6.0 \mu\text{m}$
- ▶ $\text{ClearBorder} = 4.0 \mu\text{m}$

final fit parameters:

- ▶ $gQ = (0.9952 \pm 0.187) \text{ nA/e}$
- ▶ $\text{SourceDrainBorder} = (6.2514 \pm 0.0089) \mu\text{m}$
- ▶ $\text{ClearBorder} = (4.2458 \pm 0.0186) \mu\text{m}$

$$Cor = \begin{bmatrix} 1 & -0.364 & -0.200 \\ -0.364 & 1 & 0.362 \\ -0.200 & 0.362 & 1 \end{bmatrix}$$

validation

