**Missing parameters:**

Detector/test beam setup specific:

The main information we need for the test beam setup is information about the beam so that we can replicate it in simulation, namely the beam size, position, profile, and energy spread, and information about the electronics used to digitize the signal. The exact parameters we’re unsure of and their descriptions are listed below.

* source\_energy\_spread : The standard deviation for particle energies within the beam.
* source\_position : Information on where the beam is relative to the detectors
* beam\_size : Width of the Gaussian beam profile.
* flat\_beam : Boolean to change your Gaussian beam profile to a flat beam profile.
* threshold\_smearing : Standard deviation of the Gaussian uncertainty in the threshold charge value. Defaults to 30 electrons.
* electronics\_noise : Standard deviation of the Gaussian noise in the electronics (before amplification and application of the threshold). Defaults to 110 electrons.
* gain : Gain factor the input charge is multiplied with, default 1.0
* gain\_function : Formula describing the gain as a function of the input charge. gain and gain\_function are mutually exclusive.
* gain\_parameters : Parameters of the gain formula. This parameter needs to be provided as array of values, physical units are supported for each parameter individually.
* qdc\_resolution : Resolution of the QDC in units of bits. A value of 0bit switches off the QDC simulation and returns the actual charge in electrons. Defaults to 0.
* qdc\_smearing : Standard deviation of the Gaussian noise in the ADC conversion
* qdc\_slope : Slope of the QDC calibration in electrons per ADC unit
* qdc\_offset : Offset of the QDC calibration in electrons
* allow\_zero\_qdc: Allows the QDC to return a value of zero if enabled, otherwise the minimum value returned is one.
* tdc\_resolution : Resolution of the TDC in units of bits. A value of 0bit switches off the TDC simulation and returns the actual time of arrival in nanoseconds.
* tdc\_smearing : Standard deviation of the Gaussian noise in the TDC conversion. Defaults to 50 ps.
* tdc\_slope : Slope of the TDC calibration in nanoseconds per TDC unit (unit: “ns”). Defaults to 10ns.
* tdc\_offset : Offset of the TDC calibration in nanoseconds. Defaults to 0.
* allow\_zero\_tdc: Allows the TDC to return a value of zero if enabled, otherwise the minimum value returned is one. Defaults to false.

ALPIDE specific:

For ALPIDE, we are unsure of the model for the cross section of interactions and the model for the electric field. The exact parameters we’re unsure of and their descriptions are listed below.

* enable\_pai : Determines if the Photoabsorption Ionization model is enabled in the sensors of all detectors.
* model : Type of the electric field model, either linear, constant, parabolic, custom or mesh
* depletion\_depth : Thickness of the depleted region. Used for all electric fields. When using the depletion depth for the linear model, no depletion voltage can be specified.
* depletion\_voltage : Indicates the voltage at which the sensor is fully depleted. Used to calculate the electric field if the model parameter is equal to linear.
* minimum\_field : Value of the electric field in the minimum.
* minimum\_position : Position of the electric field minimum along z, in local coordinates. Required to be located within the sensor volume.
* maximum\_field : Value of the electric field at the electrode.