

Eigenor reconstruction software process

In order to have good reconstruction results, it's extremely important to know the different factors of the X-ray imaging unit. This document describes the essential information needed as input.

Geometry

Measurement geometry defines the imaging setup and the acquisition of each projection. For each imaged projection following is needed to know:

- **The source location** (x,y and z coordinate) for each projection
- **The detector centre point location** (x,y and z coordinate) for each projection
- **Orientation of the detector** (rotations around x, y, and z axis) for each projection

This information can usually be in parametrised format, like angular step between consecutive projections, offset from centre source line compared to detector centre, distance between source and detector, rotation centre location etc.

Detector

- **Pixel size** in mm (or detector size in mm)
- **Detector size** in pixels (i.e. 32x1024)
- **Detector shape** if not planar
- **Detector manufacturer** and model

Raw data

- **Data format** (e.g. uint16, int32)
- **Endian** (little/big)
- **Size of header** (offset) in the start of file(s) in bytes
- **Data order:** if measurement would be such that detector centre is at (0,0,0) and detector pixels have format (0,y,z), then when reading file is y or z coordinate changing fastest and is pixel (0,0).

Possible values are:

- pixel with largest y, smallest z
- pixel with largest y, largest z
- pixel with smallest y, largest z
- pixel with smallest y, smallest z

Usually data order is the same in raw measurements, empty air measurements and black- current measurements.

Other data

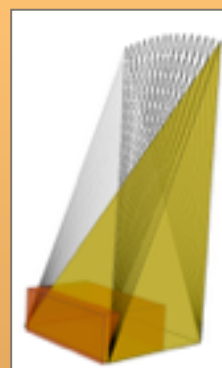
- **Empty air file**, one projection imaged without any object between source and detector or one empty air for each projection
- **Black/dark current file**, one projection where detector is turned on and measured, but the source is turned off
- **Linearised data** (optional), projections where empty air is at pre-set value, typically 0. This is an alternative to the raw data files.

Reconstructions cost-efficiently

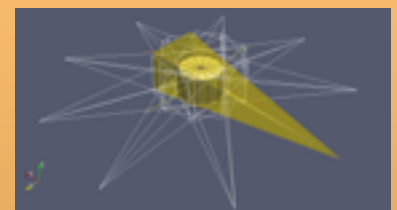
Eigenor software is optimised for off-the-shelf components. The high performance is gained cost efficiently. Eigenor software is intended for modest computing hardware, please asks hardware recommendations for your setup.

Eigenor software is fully GPU accelerated, utilising OpenCL technology. OpenCL is open and free solution, which is available for all major platforms. There are no 3rd party dependencies for Eigenor software.

Eigenor personel is always happy to assist you with any questions related to our software parameters and your device geometries.



Typical limited angle imaging geometry



Conventional rotational geometry