

aiRecSubvol

aiRecSubvol performs tomographic reconstruction of individual particles using WBP (or without any weighting at all). aiRecSubvol can also directly compute the average of the individual particles.

aiRecSubvol needs a configuration file provided by the **-u** argument. Some options can be overwritten using command line arguments.

Options are:

CudaDeviceIDs

The deviceIDs of the GPUs to use.

Argument for command line: **-d** or **--CudaDeviceIDs**

Type: **List<int>**, a list of integer values

Option is mandatory: **true**

Input

The file to process.

Argument for command line: **-i** or **--Input**

Type: **string**

Option is mandatory: **true**

OutVolumeFile

The file base name of the reconstructed volumes.

Argument for command line: **-o** or **--OutVolumeFile**

Type: **string**

Option is mandatory: **true**

OutWedgeFile

The file base name for the summed wedges corresponding to the reconstructed volumes.

Type: **string**

Option is mandatory: **true**

Only applicable if

- **SubVolumeRecMode** = REFERENCE and
- **WBPFILTER** = NONE

ReconstructionSettings

The file name for the file with reconstruction settings.

Argument for command line: **-rec** or **--ReconstructionSettings**

Type: **string**

Option is mandatory: **true**

LP

Low pass filter value.

Argument for command line: **-lp** or **--LP**

Type: **float**

Option is mandatory: **true**

LPS

Low pass filter sigma value.

Argument for command line: **-lps** or **--LPS**

Type: **float**

Option is mandatory: **true**

HP

High pass filter value.

Argument for command line: **-hp** or **--HP**

Type: **float**

Option is mandatory: **false**

Default value if not set: **0**

HPS

High pass filter sigma value.

Argument for command line: **-hps** or **--HPS**

Type: **float**

Option is mandatory: **false**

Default value if not set: **0**

DeadPixelRemoval

Enables removal of dead pixels based on thresholding. If set to 'relative', the threshold is X times the STD + MEAN of the image.

Argument for command line: **-deadPixel** or **--DeadPixelRemoval**

Type: one of [**ABSOLUTE**, **NONE**, **RELATIVE**]

Option is mandatory: **false**

Default value if not set: **NONE**

Possible notations:

- **ABSOLUTE**: ABSOLUTE, Absolute, absolute
- **NONE**: NONE, None, none
- **RELATIVE**: RELATIVE, Relative, relative

DeadPixelThreshold

Threshold above which a pixel is considered invalid.

Argument for command line: **-threshold** or **--DeadPixelThreshold**

Type: **float**

Option is mandatory: **true**

Only applicable if

- **DeadPixelRemoval** = ABSOLUTE or
- **DeadPixelRemoval** = RELATIVE

DimLength

Dim the image borders over X pixels along the projected volume borders, for volume x and y axis.

Type: **float2**, two float values

Option is mandatory: **false**

Default value if not set: **(50, 50)**

CutLength

Crop the projected image along the projected volume borders, for volume x and y axis.

Type: **float2**, two float values

Option is mandatory: **false**

Default value if not set: **(10, 10)**

OverSampling

The amount of over-sampling used for back-projection (relative to binned tilt series).

Type: **int**

Option is mandatory: **true**

RecDimensions

Size of the reconstructed sub-volume in unbinned voxels.

Type: **int3**, three integer values

Option is mandatory: **true**

VolumeBinning

Binning ratio of the reconstruction volume (relative to unbinned tilt series).

Type: **float**

Option is mandatory: **true**

DoFourierFilter

Perform fourier space filtering on the tilt series before reconstruction.

Type: **bool**

Option is mandatory: **true**

CtfCorrectionType

The type of CTF correction to perform.

Type: one of [**NONE**, **PHASE_FLIP**, **WIENER_FILTER**]

Option is mandatory: **true**

Possible notations:

- **NONE**: NONE, None, none, FALSE, false, False, NO, No, no
- **PHASE_FLIP**: PHASEFLIP, PhaseFlip, phaseflip, PHASE_FLIP, Phase_Flip, phase_flip
- **WIENER_FILTER**: WIENERFILTER, WienerFilter, wienerfilter, WIENER_FILTER, Wiener_Filter, wiener_filter

CTFSliceThickness

The thickness of a CTF slice for 3D-CTF-Correction in nanometer.

Type: **float**

Option is mandatory: **true**

Only applicable if

- **CtfCorrectionType** = PHASE_FLIP or
- **CtfCorrectionType** = WIENER_FILTER

SwitchCTFDirection

Inverses the defocus offset value (experimental, do not use).

Type: **bool**

Option is mandatory: **false**
Default value if not set: **false**
Only applicable if

- **CtfCorrectionType** = PHASE_FLIP or
- **CtfCorrectionType** = WIENER_FILTER

IgnoreZShiftForCTF

Ignore possible Z-Shift of the reconstruction volume for defocus offset.
Type: **bool**
Option is mandatory: **false**
Default value if not set: **true**
Only applicable if

- **CtfCorrectionType** = PHASE_FLIP or
- **CtfCorrectionType** = WIENER_FILTER

FP16Volume

Use float16 as internal volume storage format.
Type: **bool**
Option is mandatory: **false**
Default value if not set: **false**

ProjectionScaleFactor

Scale values in case of float16 as internal volume storage format to compensate for accuracy loss.
Type: **float**
Option is mandatory: **true**
Only applicable if **FP16Volume** = true.

ProjectionNormalization

Projection normalization method to use before reconstruction.
Type: one of [MEAN, NONE, STANDARD_DEV]
Option is mandatory: **true**
Possible notations:

- **MEAN**: MEAN, Mean, mean
- **NONE**: NONE, none, None
- **STANDARD_DEV**: STD, std, StandardDeviation, STANDARD_DEV

WBPFilter

WBP filter to use.
Type: one of [EXACT, NONE, RAMP]
Option is mandatory: **true**
Possible notations:

- **EXACT**: Exact, EXACT, exact
- **NONE**: None, NONE, none
- **RAMP**: Ramp, RAMP, ramp

DebugImages

Save temporary images to disk for debugging.

Type: **bool**

Option is mandatory: **false**

Default value if not set: **false**

CosineWeighting

Apply cosine weighting to tilted projections.

Type: **bool**

Option is mandatory: **true**

DoseWeighting

Apply dose weighting to tilts before reconstruction.

Type: **bool**

Option is mandatory: **false**

Default value if not set: **false**

MissingFrameWeighting

If set to 'true' and when frames from a dose fractionation stack were excluded, the projection is downweighted accordingly. If set to 'false' no additional weighting occurs.

Type: **bool**

Option is mandatory: **true**

Binning

Bin the tilt series images prior to reconstruction.

Type: **float**

Option is mandatory: **false**

Default value if not set: **1**

CompensateImageRotation

Rotate the image before applying the WBP filter so that the WBP is not interpolated.

Type: **bool**

Option is mandatory: **false**

Default value if not set: **false**

SubVolumeRecMode

Define if sub-volumes are reconstructed individually or directly accumulated per reference.

Type: one of [**PARTICLE**, **REFERENCE**]

Option is mandatory: **true**

Possible notations:

- **PARTICLE**: Particle, **PARTICLE**, particle
- **REFERENCE**: Reference, **REFERENCE**, reference

BatchSize

The number of particles reconstructed in parallel (per GPU).

Type: **int**

Option is mandatory: **true**
Only applicable if **SubVolumeRecMode** = PARTICLE.

MotiveList

The motive list with alignment information for each particle.
Type: **string**
Option is mandatory: **true**

ExtraShifts

Additional projection shift information for each particle (from shift refinement).
Type: **string**
Option is mandatory: **false**
Default value if not set: ""

ReduceGoldBeadArtifacts

Reduces artifacts due to the high contrast of gold beads in the tomogram.
Type: **bool**
Option is mandatory: **false**
Default value if not set: **false**

ReduceGoldBeadArtifactStrength

The strength factor for gold bead artifact reduction. The value has to be in range [0..1] and is usually > 0.5.
Type: **float**
Option is mandatory: **true**
Only applicable if **ReduceGoldBeadArtifacts** = true.

GoldBeadSize

The size of the goldbeads used in the tilt series in nm. (With a small additional margin of 1 to 2 nm and if multiple sizes are used, the larger one.)
Type: **float**
Option is mandatory: **true**
Only applicable if **ReduceGoldBeadArtifacts** = true.