
Tile Documentation

Release 0.1

Argonne National Laboratory

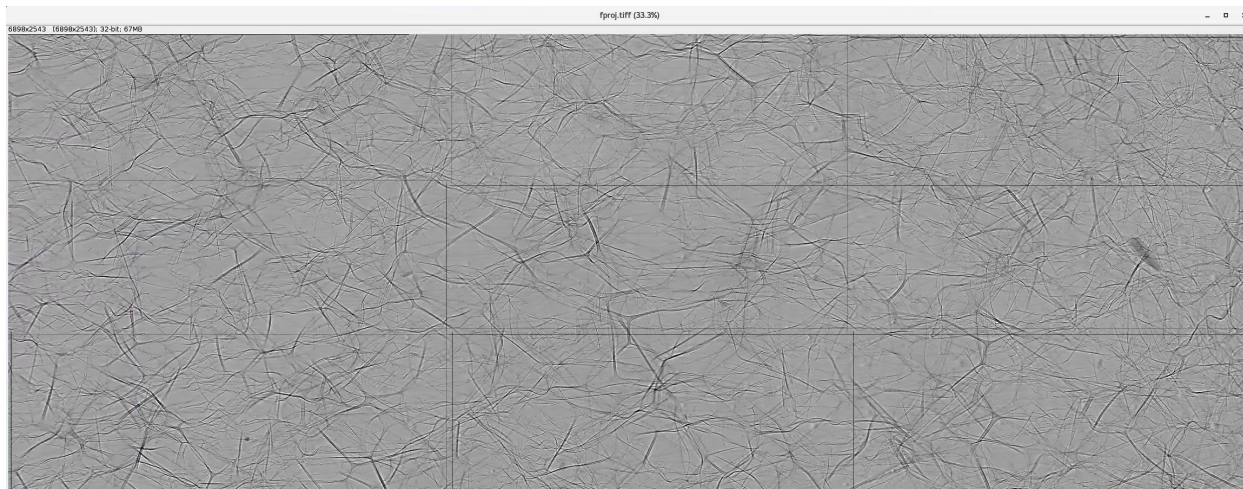
Jun 18, 2023

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tile is a command-line interface for stitching projections in horizontal direction. Stitching is done manually by selecting shifts for each tile. Selection of shifts is based on reconstructed slices and projections.

Once the stitching is completed the tomographic reconstruction can be done with [tomopy/tomopy cli](#) or [tomocupy](#)



ABOUT

`tile` is a command-line interface for stitching overlapping tomographic projection datasets in the horizontal direction. Stitching is done manually by selecting the shift for each tile. The selection of correct set of shifts is made by looking at reconstructed slices and/or projections.

INSTALLATION

First, you must have [Conda](#) installed and create a dedicated conda environment:

```
(base)$ conda create -n tile
```

and:

```
(base)$ conda activate tile  
(tile)$
```

then install all [requirements](#) with:

```
(tile)$ conda install -c conda-forge dxchange dxfile
```

and install tile

```
(tile)$ git clone https://github.com/xray-imaging/tile.git  
(tile)$ cd tile  
(tile)$ python setup.py install
```

2.1 Requirements

Besides the packages listed in [requirements](#), **tile** uses [tomopy](#) or, if you have a GPU available in your system, [tomocupy](#) to perform the tomographic reconstruction after the stitching step.

2.1.1 Install tomocupy

Follow the tomocupy [installation](#) instruction:

```
(tile)$ conda install cupy scikit-build swig pywavelets numexpr astropy olefile opencv
```

1. Install the pytorch pywavelets package for ring removal

```
(tile)$ git clone https://github.com/fbcotter/pytorch_wavelets  
(tile)$ cd pytorch_wavelets  
(tile)$ pip install .  
(tile)$ cd -
```

2. Set path to the nvcc profiler (e.g. `/local/cuda-11.4/bin/nvcc`)

```
export CUDACXX=/local/cuda-11.4/bin/nvcc
```

3. Install tomocopy

```
(tile)$ git clone https://github.com/nikitinvv/tomocopy-cli  
(tile)$ cd tomocopy-cli  
(tile)$ python setup.py install
```

2.2 Install tomopy

To install tomopy [tomopy/tomopy cli](#) follow the [tomopy install/tomopycli install](#) instructions.

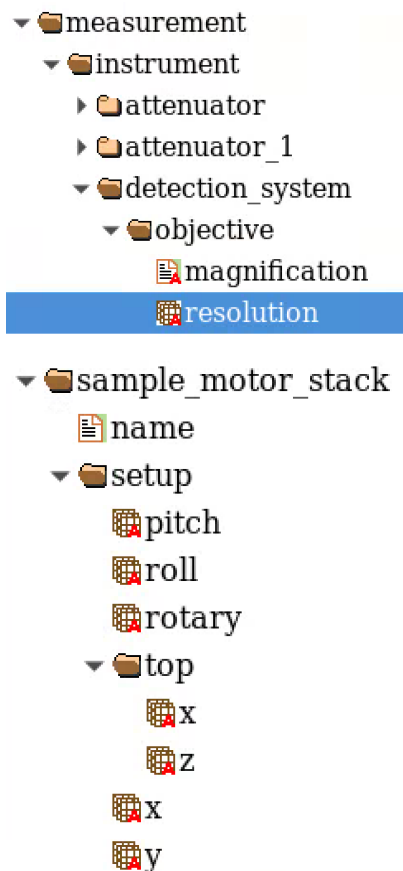
```
(tile)$ conda install -c conda-forge tomopy
```

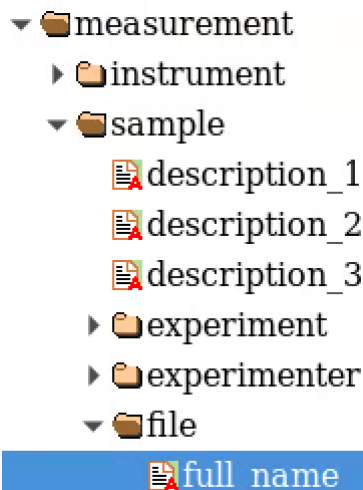
3.1 1. Verify the dataset is valid

Tile needs the following experiment meta data to automatically sort the mosaic tiles by location and set the initial overlapping conditions:

1. X-Y location of each tile in mm
2. the projection image pixel size in microns
3. the tile data set full file name

At the APS beamline [2 BM](#), these meta data are automatically stored at data collection time in an hdf file compliant with [dxfile](#) following this layout:





1. sample_x (mm) = '/measurement/instrument/sample_motor_stack/setup/x'
2. sample_y (mm) = '/measurement/instrument/sample_motor_stack/setup/y'
3. resolution (micron) = '/measurement/instrument/detection_system/objective/resolution'
4. full_file_name = '/measurement/sample/file/full_name'

If these parameters are stored somewhere else in your hdf file, you can set their locations at runtime using the `--sample-x`, `--sample-y`, `--resolution` `--full-file-name` options.

1. `--sample-x` '/your_hdf_path/to_sample_x_in_mm'
2. `--sample-y` '/your_hdf_path/to_sample_y_in_mm'
3. `--resolution` '/your_hdf_path/to_image_resolution_in_micron'
4. `--full-file-name` '/your_hdf_path/to_the_full_file_name'

By default, these are set to:

1. `--sample-x` '/measurement/instrument/sample_motor_stack/setup/x'
2. `--sample-y` '/measurement/instrument/sample_motor_stack/setup/y'
3. `--resolution` '/measurement/instrument/detection_system/objective/resolution'
4. `--full-file-name` '/measurement/sample/file/full_name'

to meet the `dxfile` definitions for beamlines `2 BM`, `7 BM` and `32 ID`.

Once the above are confirmed, you can validate the mosaic data set with:

```

(tile)$ tile show --folder-name /data/2021-12/Duchkov/mosaic/
2022-02-16 11:33:38,485 - Started tile
2022-02-16 11:33:38,485 - Saving log at /home/beams/TOMO/logs/tile_2022-02-16_11_33_38.
↪ log
2022-02-16 11:33:38,485 - checking tile files ...
2022-02-16 11:33:38,487 - Checking directory: /data/2021-12/Duchkov/mosaic for a tile_
↪ scan
2022-02-16 11:33:38,864 - tile file sorted
2022-02-16 11:33:38,865 - x0y0: x = -0.000100; y = 28.000000, file name = /data/2021-12/
↪ Duchkov/mosaic/mosaic_2073.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪ 2073.h5
  
```

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```

2022-02-16 11:33:38,865 - x1y0: x = 0.849900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2074.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2074.h5
2022-02-16 11:33:38,865 - x2y0: x = 1.699900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2075.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2075.h5
2022-02-16 11:33:38,865 - x3y0: x = 2.549900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2076.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2076.h5
2022-02-16 11:33:38,865 - x4y0: x = 3.399900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2077.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2077.h5
2022-02-16 11:33:39,035 - image size (x, y) in pixels: (2448, 2048)
2022-02-16 11:33:39,035 - tile shift (x, y) in pixels: (2428, 0)
2022-02-16 11:33:39,035 - tile overlap (x, y) in pixels: (20, 2048)
2022-02-16 11:33:39,040 - tile file name grid:
                                y_0
↳ y_1                                y_2
↳ y_3                                y_4
x_0 /data/2021-12/Duchkov/mosaic/mosaic_2073.h5 /data/2021-12/Duchkov/mosaic/mosaic_
↳2074.h5 /data/2021-12/Duchkov/mosaic/mosaic_2075.h5 /data/2021-12/Duchkov/mosaic/
↳mosaic_2076.h5 /data/2021-12/Duchkov/mosaic/mosaic_2077.h5

```

3.2 2. Find rotation center

The first step is to find the location of the rotation axis of the stitched data set. The command below, **tile center**, will stitch the projections horizontally using, as first approximation, the nominal overlap distance stored in the hdf file and will then generate a stack of reconstructed images containing the same slice (default slice is vertically in the center, adjustable with `--nsino`) with location of the rotation axis +/- 50 pixel around the middle of the horizontal size of the detector with steps of 0.25 pixels. The stack of reconstructed slice will be done using tomocopy.

```

(tile)$ tile center --nproj-per-chunk 64 --folder-name /data/2021-12/Duchkov/mosaic/ --
↳nsino-per-chunk 2 --binning 2 --center-search-width 50 --center-search-step 0.25 --
↳recon-engine tomocopy
2022-02-16 15:29:38,906 - Started tile
2022-02-16 15:29:38,906 - Saving log at /home/beams/TOMO/logs/tile_2022-02-16_15_29_38.
↳log
2022-02-16 15:29:38,906 - Run find rotation axis location
2022-02-16 15:29:38,906 - checking tile files ...
2022-02-16 15:29:38,906 - Checking directory: /data/2021-12/Duchkov/mosaic for a tile_
↳scan
2022-02-16 15:29:39,286 - tile file sorted
2022-02-16 15:29:39,287 - x0y0: x = -0.000100; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2073.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2073.h5
2022-02-16 15:29:39,287 - x1y0: x = 0.849900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2074.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2074.h5
2022-02-16 15:29:39,287 - x2y0: x = 1.699900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2075.h5, original file name = /local/data/2021-12/Duchkov/mosaic_

```

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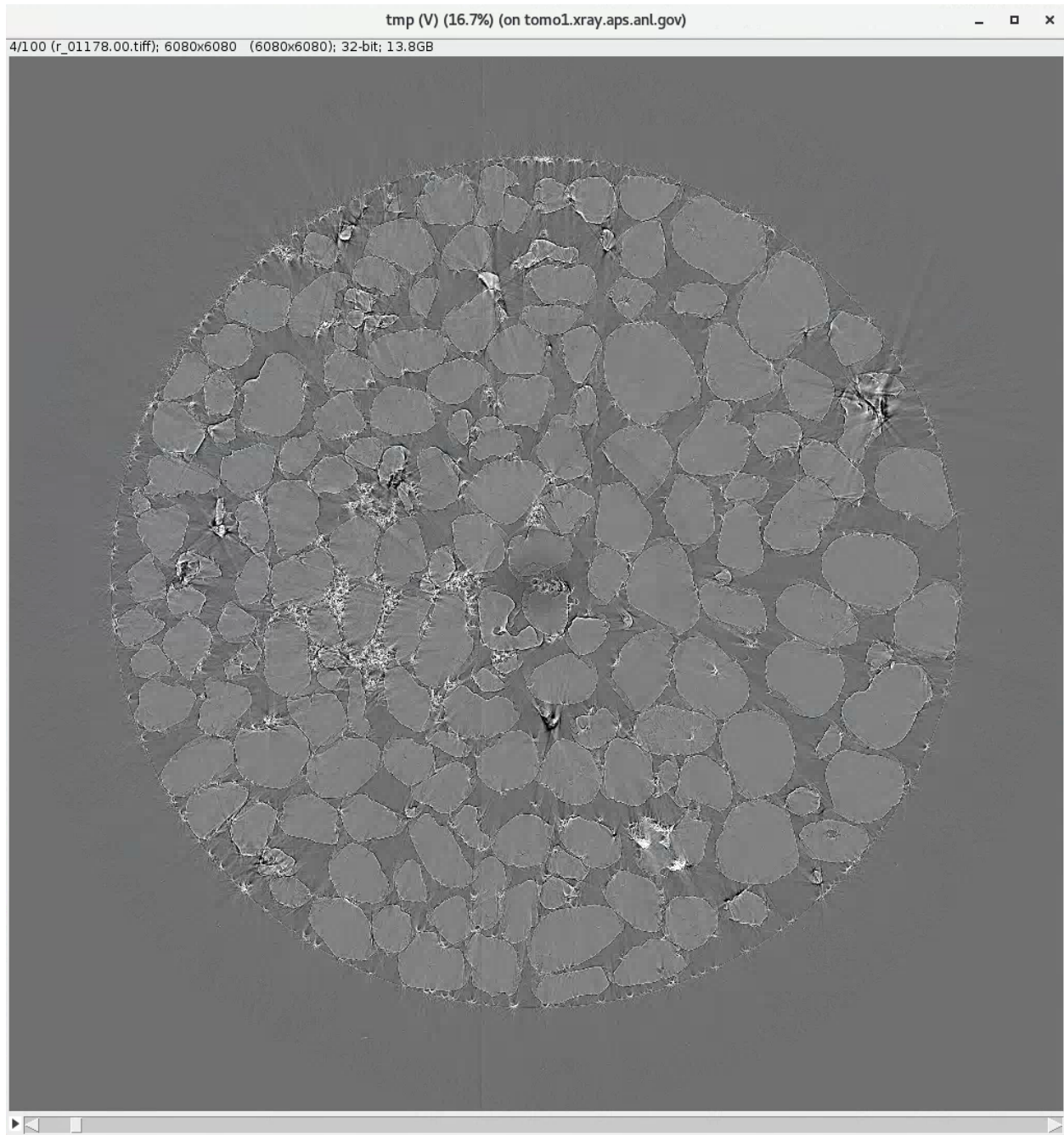
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```

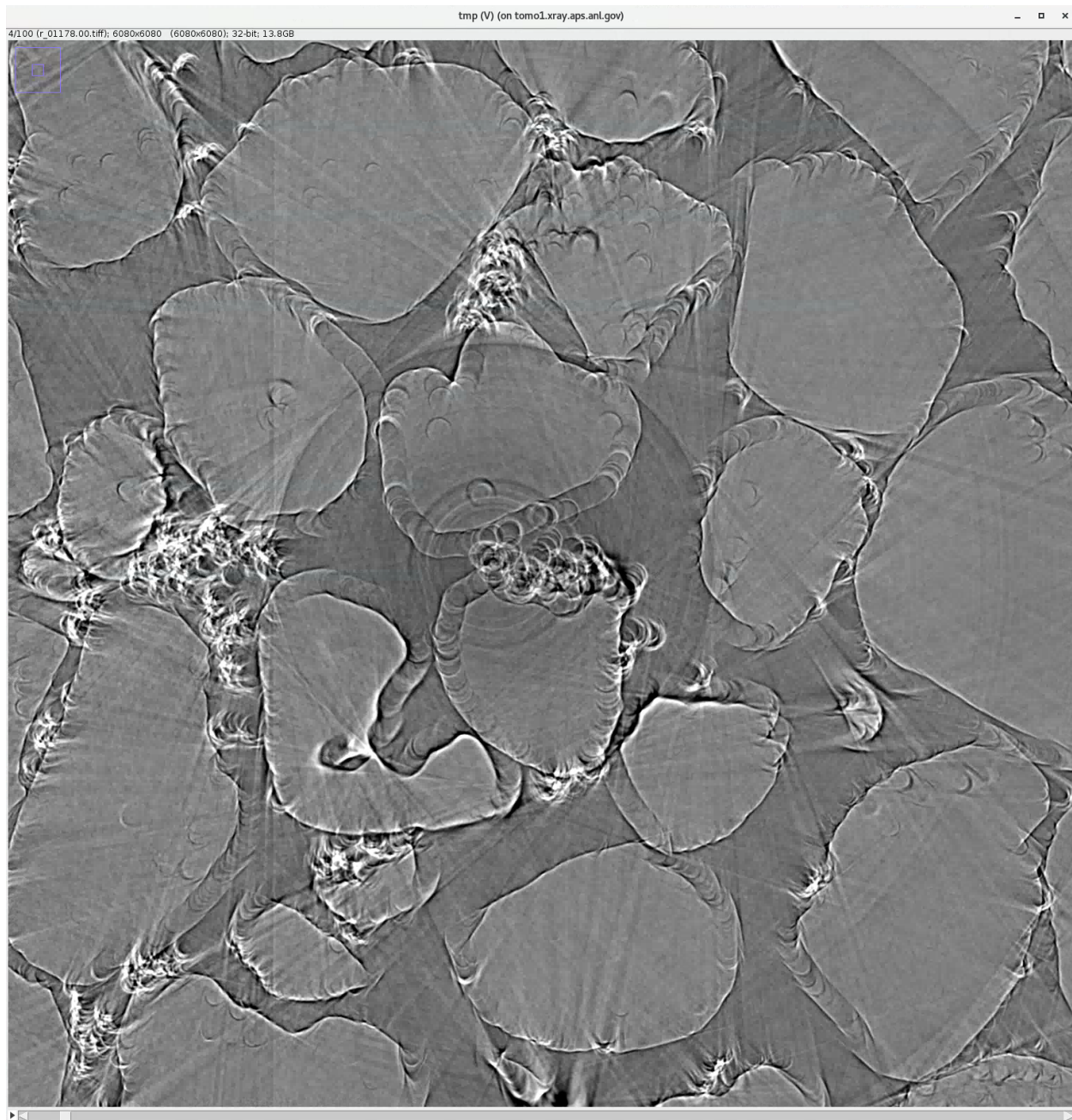
↪2075.h5
2022-02-16 15:29:39,287 - x3y0: x = 2.549900; y = 28.000000, file name = /data/2021-12/
↪Duchkov/mosaic/mosaic_2076.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2076.h5
2022-02-16 15:29:39,287 - x4y0: x = 3.399900; y = 28.000000, file name = /data/2021-12/
↪Duchkov/mosaic/mosaic_2077.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2077.h5
2022-02-16 15:29:39,456 - image size (x, y) in pixels: (2448, 2048)
2022-02-16 15:29:39,456 - stitch shift (x, y) in pixels: (2428, 0)
2022-02-16 15:29:39,456 - tile overlap (x, y) in pixels: (20, 2048)
2022-02-16 15:29:42,657 - Created a temporary hdf file: /data/2021-12/Duchkov/mosaic/
↪tile/tmp.h5
2022-02-16 15:29:42,658 - Running: tomocopy recon --file-type double_fov --binning 2 --
↪reconstruction-type try --file-name /data/2021-12/Duchkov/mosaic/tile/tmp.h5 --center-
↪search-width 50.0 --rotation-axis-auto manual --rotation-axis 1224.0 --center-search-
↪step 0.25
2022-02-16 15:29:44,427 - Try rotation center reconstruction for slice 0
queue size 000 | || 100.0%
2022-02-16 15:30:00,651 - Output: /data/2021-12/Duchkov/mosaic/tile_recgpu/try_center/
↪tmp/r_
Reconstruction time 23.8s
2022-02-16 15:30:08,307 - Please open the stack of images from /data/2021-12/Duchkov/
↪mosaic/tile_recgpu/try_center/tmp/recon* and select the rotation center

```

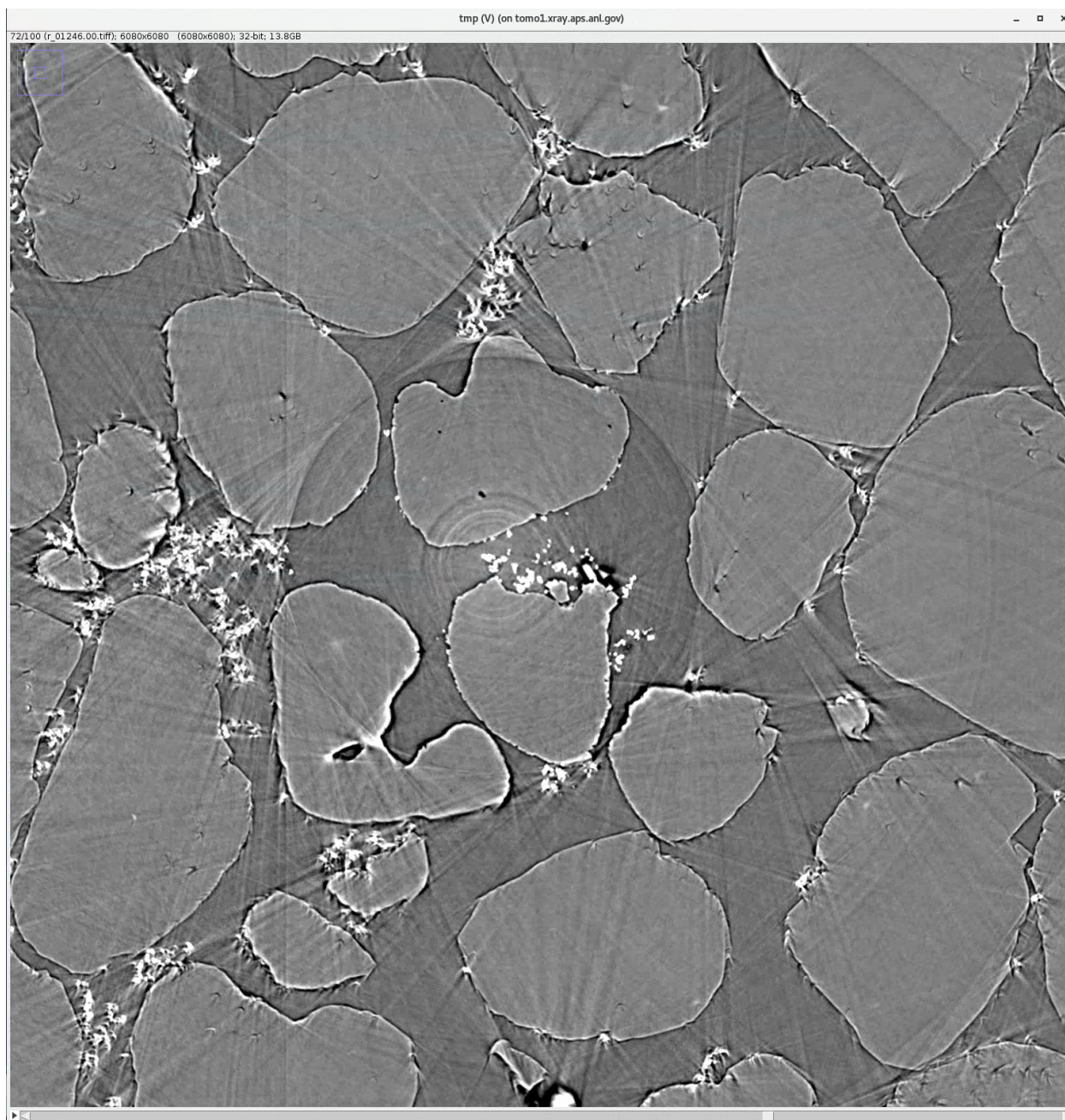
Use [Fiji ImageJ](#) to load the reconstructed slice stack with File/Import/Image Sequence:



Zoom into the center region of the image and move the slider:



until the center of the image is sharp and free of artifacts:



Please focus only on the center of the image for now. Once done, on the top left corner of the image you will see the corresponding rotation axis location, 1246 in this case. Store this for the next step.

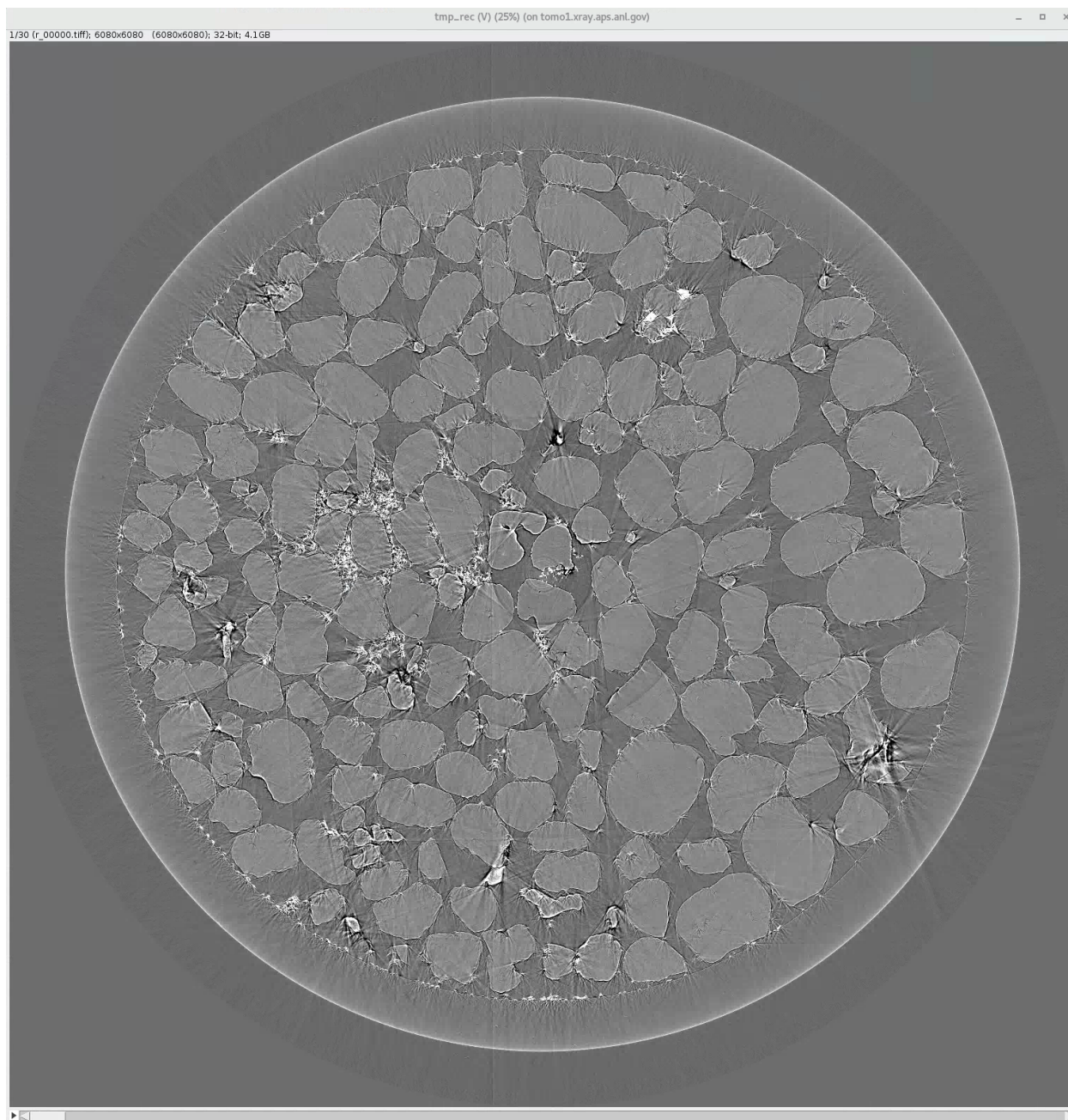
3.3 3. Tile Shift

tile center used the nominal tile overlap distance stored in the hdf file. In this step, **tile shift** will fine tune each tile location. This process will keep the center tile fixed and slide one at the time each of the tiles moving away from the center tile.

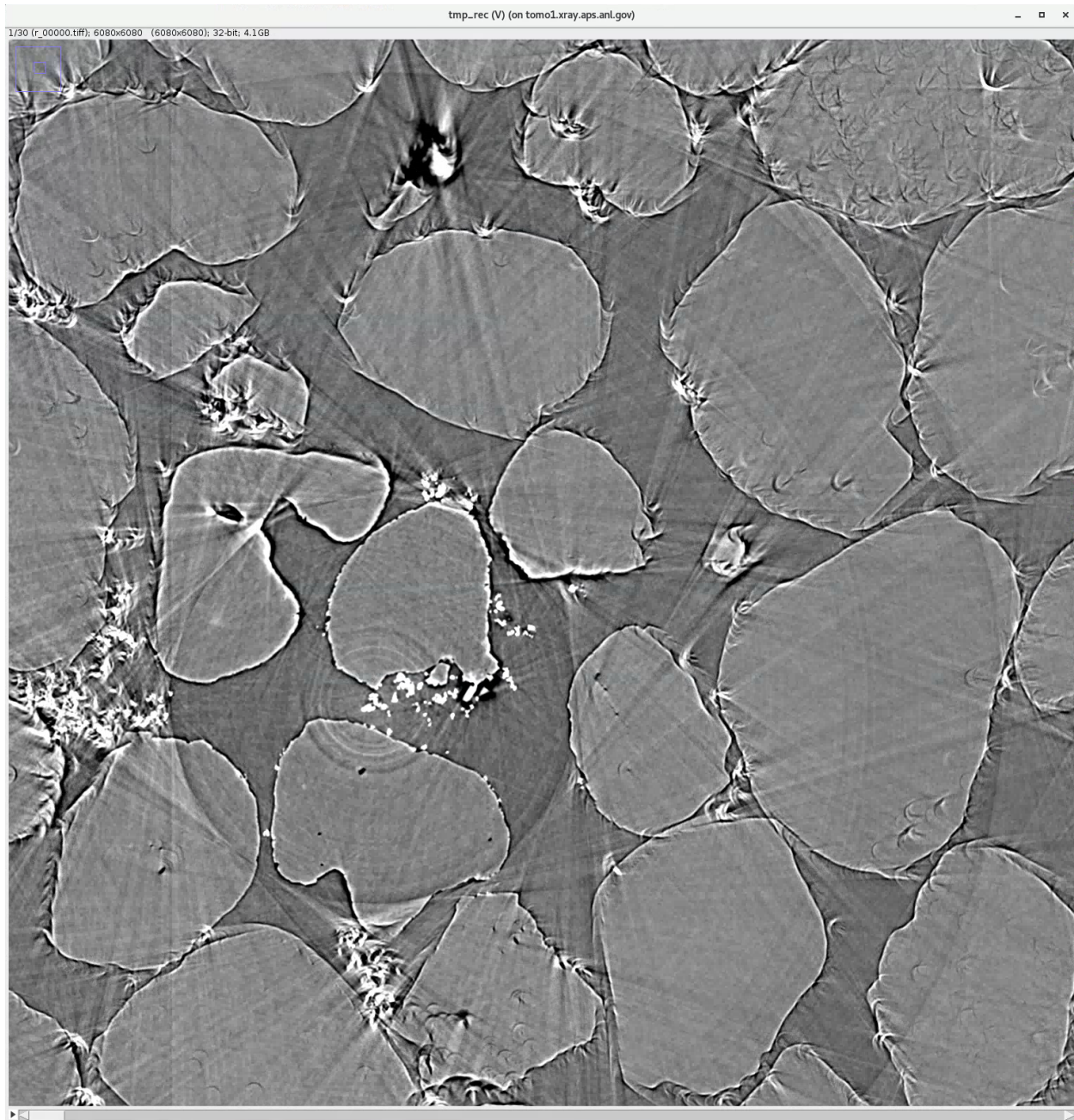
The optimal tile locations will be determined looking at reconstructed slices or at projections generated by sliding the overlap region along a preset `--shift-search-width` in steps of `--shift-search-step` pixels. The command below will shift the tiles, one at the time, by +/- 30 pixel from the nominal location stored in the hdf file at data collection time, in step of 2 pixels.

```
(tile)$ tile shift --folder-name /data/2021-12/Duchkov/mosaic/ --shift-search-width 30 --
↳shift-search-step 2 --recon-engine tomocopy
2022-02-16 17:30:08,246 - Started tile
2022-02-16 17:30:08,247 - Saving log at /home/beams/TOMO/logs/tile_2022-02-16_17_30_08.
↳log
2022-02-16 17:30:08,247 - Run manual shift
2022-02-16 17:30:08,247 - checking tile files ...
2022-02-16 17:30:08,247 - Checking directory: /data/2021-12/Duchkov/mosaic for a tile.
↳scan
2022-02-16 17:30:08,626 - tile file sorted
2022-02-16 17:30:08,626 - x0y0: x = -0.000100; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2073.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2073.h5
2022-02-16 17:30:08,626 - x1y0: x = 0.849900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2074.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2074.h5
2022-02-16 17:30:08,626 - x2y0: x = 1.699900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2075.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2075.h5
2022-02-16 17:30:08,626 - x3y0: x = 2.549900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2076.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2076.h5
2022-02-16 17:30:08,626 - x4y0: x = 3.399900; y = 28.000000, file name = /data/2021-12/
↳Duchkov/mosaic/mosaic_2077.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↳2077.h5
2022-02-16 17:30:08,792 - image size (x, y) in pixels: (2448, 2048)
2022-02-16 17:30:08,792 - stitch shift (x, y) in pixels: (2428, 0)
2022-02-16 17:30:08,792 - tile overlap (x, y) in pixels: (20, 2048)
Please enter rotation center (1224.0): 1246
2022-02-16 17:32:09,507 - Full reconstruction
queue size 000 | || 100.0%
2022-02-16 17:32:31,184 - Output: /data/2021-12/Duchkov/mosaic/tile_recgpu/tmp_rec/r
Reconstruction time 26.3s
Please open the stack of images from reconstructions /data/2021-12/Duchkov/mosaic/tile_
↳recgpu/tmp_rec/recon* or stitched projections /data/2021-12/Duchkov/mosaic/tile_recgpu/
↳tmp_proj/p*, and select the file id to shift tile 1
Please enter id for tile 1:
```

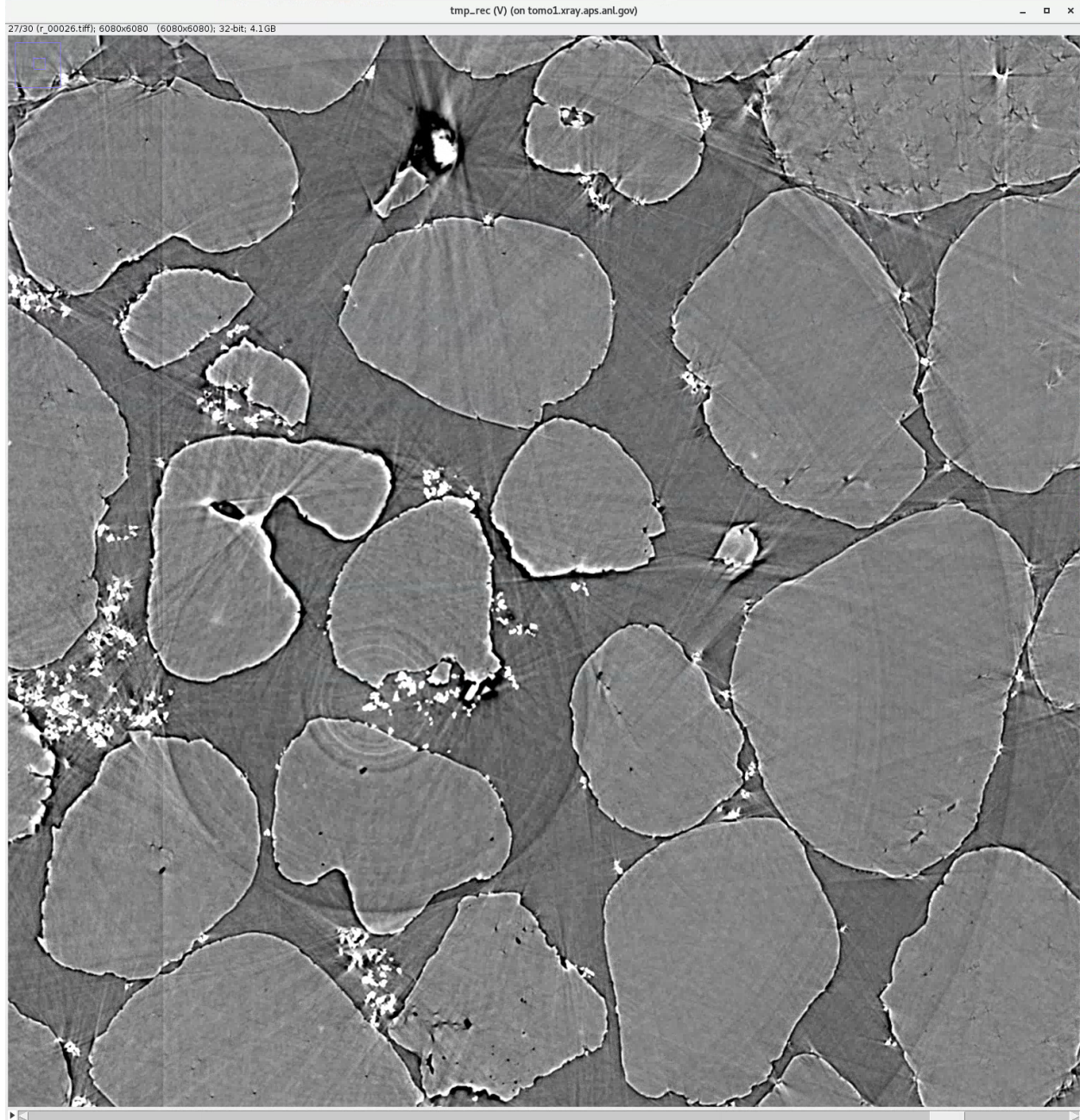
Use [Fiji ImageJ](#) to load the reconstructed slice or projection stack with File/Import/Image Sequence:



Zoom into the region of the image separating the center tile from the first tile and move the slider:



until the image in the second tile is sharp and free of artifacts:



On the top left corner of the image you will see the corresponding tile overlap index, 26 in this case, and enter it at:

```
Please enter id for tile 1: 26
2022-02-16 18:14:22,816 - Current shifts: [ 0 2450 2428 2428 2428]
```

tile shift will now repeat the same keeping the center tile and first tile fixed and slide the next tile only.

```
Please enter id for tile 1: 26
2022-02-16 18:14:22,816 - Current shifts: [ 0 2450 2428 2428 2428]
2022-02-16 18:16:02,917 - Full reconstruction
queue size 000 | || 100.0%
2022-02-16 18:16:26,167 - Output: /data/2021-12/Duchkov/mosaic/tile_recgpu/tmp_rec/r
```

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Reconstruction time 28.1s

Please open the stack of images from reconstructions /data/2021-12/Duchkov/mosaic/tile_
 ↪recgpu/tmp_rec/recon* or stitched projections /data/2021-12/Duchkov/mosaic/tile_recgpu/
 ↪tmp_proj/p*, and select the file id to shift tile 2

Repeat the [Fiji ImageJ](#) image inspection looking at the next set of tile overlap region, and, as before, enter the corresponding tile overlap index and move to the next tile.

Please enter id for tile 2: 26

2022-02-16 18:20:36,145 - Current shifts: [0 2450 2450 2428 2428]

2022-02-16 18:22:16,112 - Full reconstruction

queue size 000 | || 100.0%

2022-02-16 18:22:38,549 - Output: /data/2021-12/Duchkov/mosaic/tile_recgpu/tmp_rec/r

Reconstruction time 27.1s

Please open the stack of images from reconstructions /data/2021-12/Duchkov/mosaic/tile_
 ↪recgpu/tmp_rec/recon* or stitched projections /data/2021-12/Duchkov/mosaic/tile_recgpu/
 ↪tmp_proj/p*, and select the file id to shift tile 3

Please enter id for tile 3: 27

2022-02-16 18:23:27,249 - Current shifts: [0 2450 2450 2452 2428]

2022-02-16 18:25:07,526 - Full reconstruction

queue size 000 | || 100.0%

2022-02-16 18:25:29,959 - Output: /data/2021-12/Duchkov/mosaic/tile_recgpu/tmp_rec/r

Reconstruction time 27.3s

Please open the stack of images from reconstructions /data/2021-12/Duchkov/mosaic/tile_
 ↪recgpu/tmp_rec/recon* or stitched projections /data/2021-12/Duchkov/mosaic/tile_recgpu/
 ↪tmp_proj/p*, and select the file id to shift tile 4

Please enter id for tile 4: 28

2022-02-16 18:25:53,832 - Current shifts: [0 2450 2450 2452 2454]

2022-02-16 18:25:53,833 - Center 1246

2022-02-16 18:25:53,833 - Relative shifts [0, 2450, 2450, 2452, 2454]

3.4 4. Tile Stitch

At the end of **tile shift** step, we obtain a list of shifts [0, 2450, 2450, 2452, 2454] that we can use for the final tile stitching. **tile stitch** will generate a single hdf file merging all mosaic tiles with the correct overlap.

```
(tile)$ tile stitch --folder-name /data/2021-12/Duchkov/mosaic --nproj-per-chunk 128 --x-
↪shifts "[0, 2450, 2450, 2452, 2454]"
2022-02-16 18:30:06,770 - Started tile
2022-02-16 18:30:06,770 - Saving log at /home/beams/TOMO/logs/tile_2022-02-16_18_30_06.
↪log
2022-02-16 18:30:06,770 - Run stitching
2022-02-16 18:30:06,770 - checking tile files ...
2022-02-16 18:30:06,770 - Checking directory: /data/2021-12/Duchkov/mosaic for a tile_
↪scan
2022-02-16 18:30:07,146 - tile file sorted
2022-02-16 18:30:07,146 - x0y0: x = -0.000100; y = 28.000000, file name = /data/2021-12/
↪Duchkov/mosaic/mosaic_2073.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2073.h5
2022-02-16 18:30:07,146 - x1y0: x = 0.849900; y = 28.000000, file name = /data/2021-12/
```

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```

↪Duchkov/mosaic/mosaic_2074.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2074.h5
2022-02-16 18:30:07,146 - x2y0: x = 1.699900; y = 28.000000, file name = /data/2021-12/
↪Duchkov/mosaic/mosaic_2075.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2075.h5
2022-02-16 18:30:07,146 - x3y0: x = 2.549900; y = 28.000000, file name = /data/2021-12/
↪Duchkov/mosaic/mosaic_2076.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2076.h5
2022-02-16 18:30:07,146 - x4y0: x = 3.399900; y = 28.000000, file name = /data/2021-12/
↪Duchkov/mosaic/mosaic_2077.h5, original file name = /local/data/2021-12/Duchkov/mosaic_
↪2077.h5
2022-02-16 18:30:07,321 - Relative shifts [ 0 2450 2450 2452 2454]
2022-02-16 18:30:07,323 - Stitching projections 0 - 128
2022-02-16 18:30:20,461 - Stitching projections 128 - 256
2022-02-16 18:30:32,099 - Stitching projections 256 - 384
2022-02-16 18:30:50,475 - Stitching projections 384 - 512
2022-02-16 18:31:12,040 - Stitching projections 512 - 640
2022-02-16 18:31:30,324 - Stitching projections 640 - 768
2022-02-16 18:31:49,881 - Stitching projections 768 - 896
2022-02-16 18:32:08,534 - Stitching projections 896 - 1024
2022-02-16 18:32:26,784 - Stitching projections 1024 - 1152
2022-02-16 18:32:47,320 - Stitching projections 1152 - 1280
2022-02-16 18:33:04,260 - Stitching projections 1280 - 1408
2022-02-16 18:33:23,326 - Stitching projections 1408 - 1536
2022-02-16 18:33:41,526 - Stitching projections 1536 - 1664
2022-02-16 18:34:00,341 - Stitching projections 1664 - 1792
2022-02-16 18:34:18,362 - Stitching projections 1792 - 1920
2022-02-16 18:34:37,191 - Stitching projections 1920 - 2048
2022-02-16 18:34:55,829 - Stitching projections 2048 - 2176
2022-02-16 18:35:15,554 - Stitching projections 2176 - 2304
2022-02-16 18:35:33,733 - Stitching projections 2304 - 2432
2022-02-16 18:35:58,429 - Stitching projections 2432 - 2560
2022-02-16 18:36:16,669 - Stitching projections 2560 - 2688
2022-02-16 18:36:37,403 - Stitching projections 2688 - 2816
2022-02-16 18:37:01,131 - Stitching projections 2816 - 2944
2022-02-16 18:37:21,374 - Stitching projections 2944 - 3072
2022-02-16 18:37:40,137 - Stitching projections 3072 - 3200
2022-02-16 18:37:55,265 - Stitching projections 3200 - 3328
2022-02-16 18:38:13,574 - Stitching projections 3328 - 3456
2022-02-16 18:38:35,979 - Stitching projections 3456 - 3584
2022-02-16 18:38:57,068 - Stitching projections 3584 - 3712
2022-02-16 18:39:16,547 - Stitching projections 3712 - 3840
2022-02-16 18:39:40,333 - Stitching projections 3840 - 3968
2022-02-16 18:40:01,126 - Stitching projections 3968 - 4096
2022-02-16 18:40:23,886 - Stitching projections 4096 - 4224
2022-02-16 18:40:44,862 - Stitching projections 4224 - 4352
2022-02-16 18:41:08,228 - Stitching projections 4352 - 4480
2022-02-16 18:41:30,260 - Stitching projections 4480 - 4608
2022-02-16 18:41:52,968 - Stitching projections 4608 - 4736
2022-02-16 18:42:14,439 - Stitching projections 4736 - 4864
2022-02-16 18:42:36,661 - Stitching projections 4864 - 4992
2022-02-16 18:42:58,154 - Stitching projections 4992 - 5120

```

(continues on next page)

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```

2022-02-16 18:43:21,760 - Stitching projections 5120 - 5248
2022-02-16 18:43:43,310 - Stitching projections 5248 - 5376
2022-02-16 18:44:04,637 - Stitching projections 5376 - 5504
2022-02-16 18:44:22,942 - Stitching projections 5504 - 5632
2022-02-16 18:44:45,562 - Stitching projections 5632 - 5760
2022-02-16 18:45:03,388 - Stitching projections 5760 - 5888
2022-02-16 18:45:23,980 - Stitching projections 5888 - 6000
2022-02-16 18:55:02,606 - Output file /data/2021-12/Duchkov/mosaic/tile/tile.h5
2022-02-16 19:03:41,109 - Reconstruct /data/2021-12/Duchkov/mosaic/tile/tile.h5 with
↳ tomocupy:
2022-02-16 19:03:41,110 - tomocupy recon --file-name /data/2021-12/Duchkov/mosaic/tile/
↳ tile.h5 --rotation-axis 1246 --reconstruction-type full --file-type double_fov --
↳ remove-stripe-method fw --binning 0 --nsino-per-chunk 8 --rotation-axis-auto manual
2022-02-16 19:03:41,110 - Reconstruct /data/2021-12/Duchkov/mosaic/tile/tile.h5 with
↳ tomopy:
2022-02-16 19:03:41,110 - tomopy recon --file-name /data/2021-12/Duchkov/mosaic/tile/
↳ tile.h5 --rotation-axis 1246 --reconstruction-type full --file-type double_fov --
↳ remove-stripe-method fw --binning 0 --nsino-per-chunk 8 --rotation-axis-auto manual

```

3.5 5. Tile reconstruction

Once the stitching is completed the tomographic reconstruction can be done with [tomocupy](#) or [tomopy/tomopycli](#):

with **tomocupy**

```

(tile)$ tomocupy recon --file-name /data/2021-12/Duchkov/mosaic/tile/tile.h5 --rotation-
↳ axis 1246 --reconstruction-type full --file-type double_fov --remove-stripe-method fw -
↳ -binning 0 --nsino-per-chunk 8 --rotation-axis-auto manual

```

with **tomopy**

```

(tile)$ tomopy recon --file-name /data/2021-12/Duchkov/mosaic/tile/tile.h5 --rotation-
↳ axis 1246 --reconstruction-type full --file-type double_fov --remove-stripe-method fw -
↳ -binning 0 --nsino-per-chunk 8 --rotation-axis-auto manual

```

For more options:

```

(tile)$ tile -h
(tile)$ tile stitch -h
(tile)$ tile shift -h

```

TEST DATASET

For testing use the [Foam dataset](#) from [tomobank](#).

API REFERENCE

tile Modules:

5.1 `tile.shift`

5.2 `tile.stitch`

6.1 Citations

GPU based tomographic reconstruction is available at [tomocupy](#)

Cite [A1] if you use [tomobank](#)

Cite [A2] if you use [tomopy/tomopy cli](#)

Cite [A3] if you use [DataExchange](#)

6.2 References

BIBLIOGRAPHY

- [A1] Francesco De Carlo, Doga Gursoy, Daniel Jackson Ching, Kees Joost Batenburg, Wolfgang Ludwig, Lucia Mancini, Federica Marone, Rajmund Mokso, Daniel M. Pelt, Jan Sijbers, and Mark Rivers. Tomobank: a tomographic data repository for computational x-ray science. *Measurement Science and Technology*, 2017. URL: <https://doi.org/10.1088/1361-6501/aa9c19>.
- [A2] Gürsoy D, De Carlo F, Xiao X, and Jacobsen C. Tomopy: a framework for the analysis of synchrotron tomographic data. *Journal of Synchrotron Radiation*, 21(5):1188–1193, 2014.
- [A3] De Carlo F, Gursoy D, Marone F, Rivers M, Parkinson YD, Khan F, Schwarz N, Vine DJ, Vogt S, Gleber SC, Narayanan S, Newville M, Lanzirotti T, Sun Y, Hong YP, and Jacobsen C. Scientific data exchange: a schema for hdf5-based storage of raw and analyzed data. *Journal of Synchrotron Radiation*, 21(6):1224–1230, 2014.
- [B1] Nghia T. Vo, Robert C. Atwood, Michael Drakopoulos, and Thomas Connolley. Data processing methods and data acquisition for samples larger than the field of view in parallel-beam tomography. *Opt. Express*, 29(12):17849–17874, Jun 2021. URL: <http://www.opticsexpress.org/abstract.cfm?URI=oe-29-12-17849>, doi:10.1364/OE.418448.