
DXchange Documentation

Release 0.1.5

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Jul 15, 2018

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DXchange provides an interface with [tomoPy \[B5\]](#) and raw tomographic data collected at different synchrotron facilities including the Data Exchange file format (DXfile) [\[A1\]](#), currently in use at the Advanced Photon Source beamline 2-BM and 32-ID, at the Swiss Light Source Tomcat beamline and at the Elettra SYRMEP beamline [\[B3\]](#).

CHAPTER 1

Features

- Readers for tomographic data files collected at different facilities.
- Writers for different file formats.

CHAPTER 2

Contribute

- Documentation: <https://github.com/data-exchange/dxchange/tree/master/doc>
- Issue Tracker: <https://github.com/data-exchange/dxchange/issues>
- Source Code: <https://github.com/data-exchange/dxchange>

3.1 Install

This section covers the basics of how to download and install [DXchange](#).

Contents:

- *Installing from source*
- *Installing from Conda/Binstar*
- *Updating the installation*

3.1.1 Installing from source

Clone the [DXchange](#) from [GitHub](#) repository:

```
git clone https://github.com/data-exchange/dxchange.git dxchange
```

then:

```
cd dxchange  
python setup.py install
```

[DXchange](#) is dependent on other libraries, listed in the `requirements.txt` and `meta.yaml` files.

3.1.2 Installing from Conda/Binstar

First you must have [Conda](#) installed, then open a terminal or a command prompt window and run:

```
conda install -c conda-forge dxchange
```

3.1.3 Updating the installation

Data Management is an active project, so we suggest you update your installation frequently. To update the installation run in your terminal:

```
conda update -c conda-forge dxchange
```

For some more information about using Conda, please refer to the [docs](#).

3.2 API reference

dxchange Modules:

3.2.1 dxchange.exchange

Module for describing beamline/experiment specific data recipes.

Functions:

<code>read_als_832(fname[, ind_tomo, normalized, ...])</code>	Read ALS 8.3.2 standard data format.
<code>read_als_832h5(fname[, ind_tomo, ind_flat, ...])</code>	Read ALS 8.3.2 hdf5 file with stacked datasets.
<code>read_anka_topotomo(fname, ind_tomo, ...[, ...])</code>	Read ANKA TOPO-TOMO standard data format.
<code>read_aps_1id(fname[, ind_tomo, proj, sino])</code>	Read APS 1-ID standard data format.
<code>read_aps_2bm(fname[, proj, sino])</code>	Read APS 2-BM standard data format.
<code>read_aps_5bm(fname[, sino])</code>	Read APS 5-BM standard data format.
<code>read_aps_7bm(fname[, proj, sino])</code>	Read APS 7-BM standard data format.
<code>read_aps_13bm(fname, format[, proj, sino])</code>	Read APS 13-BM standard data format.
<code>read_aps_13id(fname[, group, proj, sino])</code>	Read APS 13-ID standard data format.
<code>read_aps_26id(image_directory, ind_tomo, ...)</code>	Read APS 26-ID tomography data from a stack of xrm files.
<code>read_aps_32id(fname[, exchange_rank, proj, ...])</code>	Read APS 32-ID standard data format.
<code>read_aus_microct(fname, ind_tomo, ind_flat, ...)</code>	Read Australian Synchrotron micro-CT standard data format.
<code>read_diamond_l12(fname, ind_tomo[, proj])</code>	Read Diamond Light Source L12 (JEEP) standard data format.
<code>read_elettra_syrmep(fname, ind_tomo, ...[, ...])</code>	Read Elettra SYRMEP standard data format.
<code>read_esrf_id19(fname[, proj, sino])</code>	Read ESRF ID-19 standard data format.
<code>read_lnls_imx(folder[, proj, sino])</code>	Read LNLS IMX standard data format.
<code>read_petraIII_p05(fname, ind_tomo, ind_flat, ...)</code>	Read Petra-III P05 standard data format.
<code>read_sls_tomcat(fname[, ind_tomo, proj, sino])</code>	Read SLS TOMCAT standard data format.

`dxchange.exchange.read_als_832` (*fname*, *ind_tomo=None*, *normalized=False*, *proj=None*, *sino=None*)
Read ALS 8.3.2 standard data format.

Parameters

- **fname** (*str*) – Path to file name without indices and extension.
- **ind_tomo** (*list of int, optional*) – Indices of the projection files to read.
- **normalized** (*boolean, optional*) – If False, darks and flats will not be read. This should only be used for cases where tomo is already normalized. 8.3.2 has a plugin that normalization is preferred to be done with prior to tomopy reconstruction.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_als_832h5` (*fname, ind_tomo=None, ind_flat=None, ind_dark=None, proj=None, sino=None*)

Read ALS 8.3.2 hdf5 file with stacked datasets.

Parameters

- **fname** (*str*) – Path to hdf5 file.
- **ind_tomo** (*list of int, optional*) – Indices of the projection files to read.
- **ind_flat** (*list of int, optional*) – Indices of the flat field files to read.
- **ind_dark** (*list of int, optional*) – Indices of the dark field files to read.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.
- *list of int* – Indices of flat field data within tomography projection list

`dxchange.exchange.read_anka_topotomo` (*fname, ind_tomo, ind_flat, ind_dark, proj=None, sino=None*)

Read ANKA TOPO-TOMO standard data format.

Parameters

- **fname** (*str*) – Path to data folder name without indices and extension.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **ind_flat** (*list of int*) – Indices of the flat field files to read.
- **ind_dark** (*list of int, optional*) – Indices of the dark field files to read.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_aps_1id` (*fname*, *ind_tomo=None*, *proj=None*, *sino=None*)
Read APS 1-ID standard data format.

Parameters

- **fname** (*str*) – Path to file name without indices and extension.
- **ind_tomo** (*list of int, optional*) – Indices of the projection files to read.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_aps_2bm` (*fname*, *proj=None*, *sino=None*)
Read APS 2-BM standard data format.

Parameters

- **fname** (*str*) – Path to hdf5 file.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_aps_5bm` (*fname*, *sino=None*)
Read APS 5-BM standard data format.

Parameters

- **fname** (*str*) – Path to data folder.
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_aps_7bm` (*fname*, *proj=None*, *sino=None*)
Read APS 7-BM standard data format.

Parameters

- **fname** (*str*) – Path to hdf5 file.

- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *array* – Projection angles in radian.

`dxchange.exchange.read_aps_8bm` (*image_directory*, *ind_tomo*, *ind_flat*, *image_file_pattern=u'image_00000.xrm'*, *flat_file_pattern=u'ref_00000.xrm'*, *proj=None*, *sino=None*)

Read APS 8-BM tomography data from a stack of xrm files.

Parameters

- **image_directory** (*str*) – Path to data folder name without indices and extension.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **ind_flat** (*list of int*) – Indices of the flat field files to read.
- **image_file_pattern** (*string*) – Specify how the projection files are named.
- **flat_file_pattern** (*string*) – Specify how the flat reference files are named.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *dictionary* – Image set metadata.

`dxchange.exchange.read_aps_13bm` (*fname*, *format*, *proj=None*, *sino=None*)

Read APS 13-BM standard data format.

Parameters

- **fname** (*str*) – Path to hdf5 file.
- **format** (*str*) – Data format. 'spe' or 'netcdf4'
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns *ndarray* – 3D tomographic data.

`dxchange.exchange.read_aps_13id` (*fname*, *group=u'xrfmap/roimap/sum_cor'*, *proj=None*, *sino=None*)

Read APS 13-ID standard data format.

Parameters

- **fname** (*str*) – Path to hdf5 file.
- **group** (*str, optional*) – Path to the group inside hdf5 file where data is located.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns *ndarray* – 3D tomographic data.

```
dxchange.exchange.read_aps_26id(image_directory, ind_tomo, ind_flat, im-  
age_file_pattern=u'image_00000.xrm',  
flat_file_pattern=u'ref_00000.xrm', proj=None, sino=None)
```

Read APS 26-ID tomography data from a stack of xrm files.

Parameters

- **fname** (*str*) – Path to data folder name without indices and extension.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **ind_flat** (*list of int*) – Indices of the flat field files to read.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *dictionary* – Image set metadata.

```
dxchange.exchange.read_aps_32id(fname, exchange_rank=0, proj=None, sino=None,  
dtype=None)
```

Read APS 32-ID standard data format.

Parameters

- **fname** (*str*) – Path to hdf5 file.
- **exchange_rank** (*int, optional*) – `exchange_rank` is added to “exchange” to point tomopy to the data to reconstruct. if rank is not set then the data are raw from the detector and are located under `exchange = “exchange/...”`, to process data that are the result of some intermediate processing step then `exchange_rank = 1, 2, ...` will direct tomopy to process “exchange1/...”.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)
- **dtype** (*numpy datatype, optional*) – Convert data to this datatype on read if specified.

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.
- *ndarray* – 1D theta in radian.

```
dxchange.exchange.read_aus_microct(fname, ind_tomo, ind_flat, ind_dark, proj=None,  
sino=None)
```

Read Australian Synchrotron micro-CT standard data format.

Parameters

- **fname** (*str*) – Path to data folder.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **ind_flat** (*list of int*) – Indices of the flat field files to read.
- **ind_dark** (*list of int*) – Indices of the dark field files to read.

- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_diamond_112` (*fname, ind_tomo, proj=None*)
Read Diamond Light Source L12 (JEEP) standard data format.

Parameters

- **fname** (*str*) – Path to data folder.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.

`dxchange.exchange.read_elettra_syrmep` (*fname, ind_tomo, ind_flat, ind_dark, proj=None, sino=None*)
Read Elettra SYRMEP standard data format.

Parameters

- **fname** (*str*) – Path to data folder.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **ind_flat** (*list of int*) – Indices of the flat field files to read.
- **ind_dark** (*list of int*) – Indices of the dark field files to read.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_esrf_id19` (*fname, proj=None, sino=None*)
Read ESRF ID-19 standard data format.

Parameters

- **fname** (*str*) – Path to edf file.
- **proj** (*{sequence, int}, optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}, optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.

- *ndarray* – 3D dark field data.

`dxchange.exchange.read_lnlx_imx` (*folder*, *proj=None*, *sino=None*)

Read LNLS IMX standard data format.

Parameters

- **folder** (*str*) – Path to sample folder (containing *tomo.h5*, *flat.h5*, *dark.h5*)
- **proj** (*{sequence, int}*, *optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}*, *optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_petraIII_p05` (*fname*, *ind_tomo*, *ind_flat*, *ind_dark*, *proj=None*,
sino=None)

Read Petra-III P05 standard data format.

Parameters

- **fname** (*str*) – Path to data folder.
- **ind_tomo** (*list of int*) – Indices of the projection files to read.
- **ind_flat** (*list of int*) – Indices of the flat field files to read.
- **ind_dark** (*list of int*) – Indices of the dark field files to read.
- **proj** (*{sequence, int}*, *optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}*, *optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

`dxchange.exchange.read_sls_tomcat` (*fname*, *ind_tomo=None*, *proj=None*, *sino=None*)

Read SLS TOMCAT standard data format.

Parameters

- **fname** (*str*) – Path to file name without indices and extension.
- **ind_tomo** (*list of int*, *optional*) – Indices of the projection files to read.
- **proj** (*{sequence, int}*, *optional*) – Specify projections to read. (start, end, step)
- **sino** (*{sequence, int}*, *optional*) – Specify sinograms to read. (start, end, step)

Returns

- *ndarray* – 3D tomographic data.
- *ndarray* – 3D flat field data.
- *ndarray* – 3D dark field data.

3.2.2 dxchange.reader

Module for importing data files.

Functions:

<code>read_edf(fname[, slc])</code>	Read data from edf file.
<code>read_hdf5(fname, dataset[, slc, dtype, shared])</code>	Read data from hdf5 file from a specific group.
<code>read_netcdf4(fname, group[, slc])</code>	Read data from netcdf4 file from a specific group.
<code>read_npy(fname[, slc])</code>	Read binary data from a <code>.npy</code> file.
<code>read_spe(fname[, slc])</code>	Read data from spe file.
<code>read_fits(fname[, fixdtype])</code>	Read data from fits file.
<code>read_tiff(fname[, slc])</code>	Read data from tiff file.
<code>read_tiff_stack(fname, ind[, digit, slc])</code>	Read data from stack of tiff files in a folder.
<code>read_hdf5_stack(h5group, dname, ind[, ...])</code>	Read data from stacked datasets in a hdf5 file
<code>read_xrm(fname[, slice_range])</code>	Read data from xrm file.
<code>read_xrm_stack(fname, ind[, slc])</code>	Read data from stack of xrm files in a folder.
<code>read_txrm(file_name[, slice_range])</code>	Read data from a <code>.txrm</code> file, a compilation of <code>.xrm</code> files.

`dxchange.reader.read_edf` (*fname*, *slc=None*)

Read data from edf file.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Data.

`dxchange.reader.read_hdf5` (*fname*, *dataset*, *slc=None*, *dtype=None*, *shared=False*)

Read data from hdf5 file from a specific group.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **dataset** (*str*) – Path to the dataset inside hdf5 file where data is located.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.
- **dtype** (*numpy datatype (optional)*) – Convert data to this datatype on read if specified.
- **shared** (*bool (optional)*) – If True, read data into shared memory location. Defaults to True.

Returns *ndarray* – Data.

`dxchange.reader.read_netcdf4` (*fname*, *group*, *slc=None*)

Read data from netcdf4 file from a specific group.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **group** (*str*) – Variable name where data is stored.

- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Data.

`dxchange.reader.read_npy` (*fname, slc=None*)

Read binary data from a .npy file.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Data.

`dxchange.reader.read_spe` (*fname, slc=None*)

Read data from spe file.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Data.

`dxchange.reader.read_fits` (*fname, fixdtype=True*)

Read data from fits file.

Parameters **fname** (*str*) – String defining the path of file or file name.

Returns *ndarray* – Data.

`dxchange.reader.read_tiff` (*fname, slc=None*)

Read data from tiff file.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Output 2D image.

`dxchange.reader.read_tiff_stack` (*fname, ind, digit=None, slc=None*)

Read data from stack of tiff files in a folder.

Parameters

- **fname** (*str*) – One of the file names in the tiff stack.
- **ind** (*list of int*) – Indices of the files to read.
- **digit** (*int*) – (Deprecated) Number of digits used in indexing stacked files.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Output 3D image.

`dxchange.reader.read_xrm(fname, slice_range=None)`

Read data from xrm file.

Parameters

- **fname** (*str*) – String defining the path of file or file name.
- **slice_range** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Output 2D image.

`dxchange.reader.read_xrm_stack(fname, ind, slc=None)`

Read data from stack of xrm files in a folder.

Parameters

- **fname** (*str*) – One of the file names in the tiff stack.
- **ind** (*list of int*) – Indices of the files to read.
- **slc** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns *ndarray* – Output 3D image.

`dxchange.reader.read_txrm(file_name, slice_range=None)`

Read data from a .txrm file, a compilation of .xrm files.

Parameters

- **file_name** (*str*) – String defining the path of file or file name.
- **slice_range** (*sequence of tuples, optional*) – Range of values for slicing data in each axis. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix.

Returns

- *ndarray* – Array of 2D images.
- *dictionary* – Dictionary of metadata.

`dxchange.reader.read_hdf5_stack(h5group, dname, ind, digit=4, slc=None, out_ind=None)`

Read data from stacked datasets in a hdf5 file

Parameters

- **fname** (*str*) – One of the dataset names in the dataset stack
- **ind** (*list of int*) – Indices of the datasets to be read
- **digit** (*int*) – (Deprecated) Number of digits indexing the stacked datasets
- **slc** (*{sequence, int}*) – Range of values for slicing data. ((start_1, end_1, step_1), ... , (start_N, end_N, step_N)) defines slicing parameters for each axis of the data matrix
- **out_ind** (*list of int, optional*) – Outer level indices for files with two levels of indexing. i.e. [name_000_000.tif, name_000_001.tif, ... , name_000_lmn.tif, name_001_lmn.tif, ... , ... , name_fgh_lmn.tif]

`dxchange.reader.read_file_list(file_list)`

Read data from stack of image files in a folder.

Parameters `file_list` (*list of str*) – List of file names to read, in order

3.2.3 dxchange.writer

Module for data exporting data files.

Functions:

<code>write_dxf(data[, fname, axes, dtype, overwrite])</code>	Write data to a data exchange hdf5 file.
<code>write_hdf5(data[, fname, gname, dname, ...])</code>	Write data to hdf5 file in a specific group.
<code>write_numpy(data[, fname, dtype, overwrite])</code>	Write data to a binary file in NumPy .npz format.
<code>write_tiff(data[, fname, dtype, overwrite])</code>	Write image data to a tiff file.
<code>write_tiff_stack(data[, fname, dtype, axis, ...])</code>	Write data to stack of tiff file.

`dxchange.writer.write_dxf` (*data*, *fname*=u'tmp/data.h5', *axes*=u'theta:y:x', *dtype*=None, *overwrite*=False)
Write data to a data exchange hdf5 file.

Parameters

- **data** (*ndarray*) – Array data to be saved.
- **fname** (*str*) – File name to which the data is saved. .h5 extension will be appended if it does not already have one.
- **axes** (*str*) – Attribute labels for the data array axes.
- **dtype** (*data-type, optional*) – By default, the data-type is inferred from the input data.
- **overwrite** (*bool, optional*) – if True, overwrites the existing file if the file exists.

`dxchange.writer.write_hdf5` (*data*, *fname*=u'tmp/data.h5', *gname*=u'exchange', *dname*=u'data', *dtype*=None, *overwrite*=False, *appendaxis*=None, *maxsize*=None)
Write data to hdf5 file in a specific group.

Parameters

- **data** (*ndarray*) – Array data to be saved.
- **fname** (*str*) – File name to which the data is saved. .h5 extension will be appended if it does not already have one.
- **gname** (*str, optional*) – Path to the group inside hdf5 file where data will be written.
- **dname** (*str, optional*) – Name for dataset where data will be written.
- **dtype** (*data-type, optional*) – By default, the data-type is inferred from the input data.
- **overwrite** (*bool, optional*) – if True, overwrites the existing file if the file exists.
- **appendaxis** (*int, optional*) – Axis where data is to be appended to. Must be given when creating a resizable dataset.
- **maxsize** (*int, optional*) – Maximum size that the dataset can be resized to along the given axis.

`dxchange.writer.write_numpy` (*data*, *fname*=u'tmp/data.npz', *dtype*=None, *overwrite*=False)
Write data to a binary file in NumPy .npz format.

Parameters

- **data** (*ndarray*) – Array data to be saved.
- **fname** (*str*) – File name to which the data is saved. `.npy` extension will be appended if it does not already have one.

`dxchange.writer.write_tiff` (*data, fname=u'tmp/data.tiff', dtype=None, overwrite=False*)
Write image data to a tiff file.

Parameters

- **data** (*ndarray*) – Array data to be saved.
- **fname** (*str*) – File name to which the data is saved. `.tiff` extension will be appended if it does not already have one.
- **dtype** (*data-type, optional*) – By default, the data-type is inferred from the input data.
- **overwrite** (*bool, optional*) – if True, overwrites the existing file if the file exists.

`dxchange.writer.write_tiff_stack` (*data, fname=u'tmp/data.tiff', dtype=None, axis=0, digit=5, start=0, overwrite=False*)

Write data to stack of tiff file.

Parameters

- **data** (*ndarray*) – Array data to be saved.
- **fname** (*str*) – Base file name to which the data is saved. `.tiff` extension will be appended if it does not already have one.
- **dtype** (*data-type, optional*) – By default, the data-type is inferred from the input data.
- **axis** (*int, optional*) – Axis along which stacking is performed.
- **start** (*int, optional*) – First index of file in stack for saving.
- **digit** (*int, optional*) – Number of digits in indexing stacked files.
- **overwrite** (*bool, optional*) – if True, overwrites the existing file if the file exists.

3.3 Examples

Below are examples for reading tomographic data sets from different facilities and process them with TomoPy [B5].

3.3.1 Anka TopoTomo

This section contains a script to read the Anka TopoTomo tomography dataset and reconstruct it with tomoPy.

Download file: `rec_anka.py`

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the Anka topo-tomo tomography data as
6  original tiff.
7  """
8
9  from __future__ import print_function
10 import tomopy

```

(continues on next page)

```

11 import dxchange
12
13 if __name__ == '__main__':
14     # Set path to the micro-CT data to reconstruct.
15     fname = 'data_dir/'
16
17     proj_start = 0
18     proj_end = 1800
19     flat_start = 0
20     flat_end = 100
21     dark_start = 0
22     dark_end = 100
23
24     ind_tomo = range(proj_start, proj_end)
25     ind_flat = range(flat_start, flat_end)
26     ind_dark = range(dark_start, dark_end)
27
28     # Select the sinogram range to reconstruct.
29     start = 0
30     end = 16
31
32     # Read the Anka tiff raw data.
33     proj, flat, dark = dxchange.read_anka_topotomo(fname, ind_tomo, ind_flat,
34                                                  ind_dark, sino=(start, end))
35
36     # Set data collection angles as equally spaced between 0-180 degrees.
37     theta = tomopy.angles(proj.shape[0])
38
39     # Flat-field correction of raw data.
40     proj = tomopy.normalize(proj, flat, dark)
41
42     # Find rotation center.
43     rot_center = tomopy.find_center(proj, theta, init=1024,
44                                   ind=0, tol=0.5)
45     print("Center of rotation: ", rot_center)
46
47     proj = tomopy.minus_log(proj)
48
49     # Reconstruct object using Gridrec algorithm.
50     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
51
52     # Mask each reconstructed slice with a circle.
53     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
54
55     # Write data as stack of TIFFs.
56     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.2 Australian Synchrotron

This section contains a script to read the Australian Synchrotron Facility tomography dataset and reconstruct it with tomoPy.

Download file: [rec_australian.py](#)


```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the Australian Synchrotron Facility
6  data as original tiff.
7  """
8
9  from __future__ import print_function
10 import tomopy
11 import dxchange
12
13 if __name__ == '__main__':
14
15     # Set path to the micro-CT data to reconstruct.
16     fname = 'data_dir/'
17
18     proj_start = 0
19     proj_end = 1801
20     flat_start = 0
21     flat_end = 10
22     dark_start = 0
23     dark_end = 10
24
25     ind_tomo = range(proj_start, proj_end)
26     ind_flat = range(flat_start, flat_end)
27     ind_dark = range(dark_start, dark_end)
28
29     # Select the sinogram range to reconstruct.
30     start = 290
31     end = 294
32
33     # Read the Australian Synchrotron Facility data
34     proj, flat, dark = dxchange.read_aus_microct(fname, ind_tomo, ind_flat, ind_dark,
↪sino=(start, end))
35
36     # Set data collection angles as equally spaced between 0-180 degrees.
37     theta = tomopy.angles(proj.shape[0])
38
39     # Flat-field correction of raw data.
40     proj = tomopy.normalize(proj, flat, dark)
41
42     # Find rotation center.
43     rot_center = tomopy.find_center(proj, theta, init=1024, ind=0, tol=0.5)
44     print("Center of rotation: ", rot_center)
45
46     proj = tomopy.minus_log(proj)
47
48     # Reconstruct object using Gridrec algorithm.
49     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
50
51     # Mask each reconstructed slice with a circle.
52     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
53
54     # Write data as stack of TIFs.
55     dxchange.write_tiff_stack(rec, fname='recon_dir/aus_')

```

3.3.3 ALS 8.3.2

This section contains a script to read the als 8.3.2 tomography dataset and reconstruct it with tomoPy.

Download file: `rec_als.py` and `rec_als_hdf5.py`

3.3.4 Elettra Syrmep

This section contains a script to read the Elettra syrmep tomography dataset and reconstruct it with tomoPy.

Download file: `rec_elettra.py`

```
1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the Elettra syrmep data as original tiff.
6  """
7
8  from __future__ import print_function
9  import tomopy
10 import dxchange
11
12 if __name__ == '__main__':
13
14     # Set path to the CT data to reconstruct.
15     fname = 'data_dir/'
16
17     proj_start = 1
18     proj_end = 1801
19     flat_start = 1
20     flat_end = 11
21     dark_start = 1
22     dark_end = 11
23
24     ind_tomo = range(proj_start, proj_end)
25     ind_flat = range(flat_start, flat_end)
26     ind_dark = range(dark_start, dark_end)
27
28     # Select the sinogram range to reconstruct.
29     start = 0
30     end = 16
31
32     # Read the Elettra syrmep
33     proj, flat, dark = dxchange.read_elettra_syrmep(fname, ind_tomo, ind_flat, ind_
↪dark, sino=(start, end))
34
35     # Set data collection angles as equally spaced between 0-180 degrees.
36     theta = tomopy.angles(proj.shape[0], 0, 180)
37
38     # Flat-field correction of raw data.
39     proj = tomopy.normalize(proj, flat, dark)
40
41     # Find rotation center.
42     rot_center = tomopy.find_center(proj, theta, init=1024, ind=0, tol=0.5)
43     print("Center of rotation: ", rot_center)
44
```

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```

45 proj = tomopy.minus_log(proj)
46
47 # Reconstruct object using Gridrec algorithm.
48 rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
49
50 # Mask each reconstructed slice with a circle.
51 rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
52
53 # Write data as stack of TIFs.
54 dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.5 ESRF ID-19

This section contains a script to read the ESRF ID-19 tomography dataset and reconstruct it with tomoPy.

Download file: [rec_esrf.py](#)

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the ESRF tomography data as original edf
6  files.
7  """
8
9  from __future__ import print_function
10 import tomopy
11 import dxchange
12
13 if __name__ == '__main__':
14     # Set path to the micro-CT data to reconstruct.
15     fname = 'data_dir/'
16
17     # Select the sinogram range to reconstruct.
18     start = 0
19     end = 16
20
21     # Read the ESRF ID-19 raw data.
22     proj, flat, dark = dxchange.read_esrf_id19(fname, sino=(start, end))
23
24     # Set data collection angles as equally spaced between 0-180 degrees.
25     theta = tomopy.angles(proj.shape[0])
26
27     # Flat-field correction of raw data.
28     proj = tomopy.normalize(proj, flat, dark)
29
30     # Find rotation center.
31     rot_center = tomopy.find_center(proj, theta, init=1024,
32                                   ind=0, tol=0.5)
33     print("Center of rotation: ", rot_center)
34
35     proj = tomopy.minus_log(proj)
36
37     # Reconstruct object using Gridrec algorithm.
38     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')

```

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```

39
40     # Mask each reconstructed slice with a circle.
41     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
42
43     # Write data as stack of TIFs.
44     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.6 APS 1-ID

This section contains a script to read the APS 1-ID tomography dataset and reconstruct it with tomoPy.

Download file: [rec_aps_lid.py](#)

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the APS 1-ID tomography data as original tiff.
6  """
7
8  from __future__ import print_function
9  import tomopy
10 import dxchange
11
12 if __name__ == '__main__':
13
14     # Set path to the micro-CT data to reconstruct.
15     fname = 'data_dir/sample_name_prefix'
16
17     # Select the sinogram range to reconstruct.
18     start = 0
19     end = 16
20
21     # Read the APS 1-ID raw data.
22     proj, flat, dark = dxchange.read_aps_lid(fname, sino=(start, end))
23
24     # Set data collection angles as equally spaced between 0-180 degrees.
25     theta = tomopy.angles(proj.shape[0])
26
27     # Flat-field correction of raw data.
28     proj = tomopy.normalize(proj, flat, dark)
29
30     # Find rotation center.
31     rot_center = tomopy.find_center(proj, theta, init=1024, ind=0, tol=0.5)
32     print("Center of rotation: ", rot_center)
33
34     proj = tomopy.minus_log(proj)
35
36     # Reconstruct object using Gridrec algorithm.
37     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
38
39     # Mask each reconstructed slice with a circle.
40     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
41
42     # Write data as stack of TIFs.
43     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.7 APS 5-BM

This section contains a script to read the APS 5-BM tomography dataset and reconstruct it with tomoPy.

Download file: `rec_aps_5bm.py`

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the APS 5-BM data as original xmt.
6  xmt are 16 bit unsigned integer tiff file that requires a byte swap before
7  being processed.
8  """
9
10 from __future__ import print_function
11 import tomopy
12 import dxchange
13
14 if __name__ == '__main__':
15
16     # Set path to the micro-CT data to reconstruct.
17     fname = 'data_dir/'
18
19     # Select the sinogram range to reconstruct.
20     start = 290
21     end = 294
22
23     # Read the APS 5-BM raw data
24     proj, flat, dark = dxchange.read_aps_5bm(fname, sino=(start, end))
25
26     # Set data collection angles as equally spaced between 0-180 degrees.
27     theta = tomopy.angles(proj.shape[0])
28
29     # Flat-field correction of raw data.
30     proj = tomopy.normalize(proj, flat, dark)
31
32     # remove stripes
33     proj = tomopy.remove_stripe_fw(proj, level=7, wname='sym16', sigma=1, pad=True)
34
35     # Set rotation center.
36     rot_center = proj.shape[2] / 2.0
37     print("Center of rotation: ", rot_center)
38
39     proj = tomopy.minus_log(proj)
40
41     # Reconstruct object using Gridrec algorithm.
42     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
43
44     # Mask each reconstructed slice with a circle.
45     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
46
47     # Write data as stack of TIFFs.
48     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.8 APS 8-BM

This section contains a script to read the X-radia XRM tomography dataset and reconstruct it with tomoPy.

Download file: `rec_aps_8bm.py`

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the xrm tomography data from
6  the original stack of xrm. To use rename the xrm data as
7  radios/image_00000.xrm and flats/ref_00000.xrm
8  """
9
10 from __future__ import print_function
11 import tomopy
12 import dxchange
13
14 if __name__ == '__main__':
15     # Set path to the micro-CT data to reconstruct.
16     fname = 'data_dir/'
17
18     proj_start = 0
19     proj_end = 1800
20     flat_start = 0
21     flat_end = 100
22
23     ind_tomo = range(proj_start, proj_end)
24     ind_flat = range(flat_start, flat_end)
25
26     # Select the sinogram range to reconstruct.
27     start = 0
28     end = 16
29
30     # Read the APS 8-BM raw data.
31     proj, flat, metadata = dxchange.read_aps_8bm(fname, ind_tomo, ind_flat,
32                                               sino=(start, end))
33
34     # make the darks
35     dark = np.zeros((1, proj.shape[1], proj.shape[2]))
36
37     # Set data collection angles as equally spaced between 0-180 degrees.
38     theta = tomopy.angles(proj.shape[0])
39
40     # Flat-field correction of raw data.
41     proj = tomopy.normalize(proj, flat, dark)
42
43     # Find rotation center.
44     rot_center = tomopy.find_center(proj, theta, init=1024,
45                                   ind=0, tol=0.5)
46     print("Center of rotation: ", rot_center)
47
48     proj = tomopy.minus_log(proj)
49
50     # Reconstruct object using Gridrec algorithm.
51     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
52

```

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```

53     # Mask each reconstructed slice with a circle.
54     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
55
56     # Write data as stack of TIFs.
57     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.9 APS 13-BM

This section contains a script to read the APS 13-BM tomography dataset and reconstruct it with tomoPy.

Download file: `rec_aps_13bm.py`

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the APS 13-BM tomography data as
6  original netcdf files.
7
8  Warning
9  -----
10 Not implemented yet.
11 """

```

3.3.10 APS 26-ID

This section contains a script to read the X-radia XRM tomography dataset and reconstruct it with tomoPy.

Download file: `rec_aps_26id.py`

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the xrm tomography data from
6  the original stack of xrm. To use rename the xrm data as
7  radios/image_00000.xrm and flats/ref_00000.xrm
8  """
9
10 from __future__ import print_function
11 import tomopy
12 import dxchange
13
14 if __name__ == '__main__':
15     # Set path to the micro-CT data to reconstruct.
16     fname = 'data_dir/'
17
18     proj_start = 0
19     proj_end = 1800
20     flat_start = 0
21     flat_end = 100
22
23     ind_tomo = range(proj_start, proj_end)
24     ind_flat = range(flat_start, flat_end)

```

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```

25
26     # Select the sinogram range to reconstruct.
27     start = 0
28     end = 16
29
30     # Read the APS 26-ID raw data.
31     proj, flat, metadata = dxchange.read_aps_26id(fname, ind_tomo, ind_flat,
32                                               sino=(start, end))
33
34     # make the darks
35     dark = np.zeros((1, proj.shape[1], proj.shape[2]))
36
37     # Set data collection angles as equally spaced between 0-180 degrees.
38     theta = tomopy.angles(proj.shape[0])
39
40     # Flat-field correction of raw data.
41     proj = tomopy.normalize(proj, flat, dark)
42
43     # Find rotation center.
44     rot_center = tomopy.find_center(proj, theta, init=1024,
45                                   ind=0, tol=0.5)
46     print("Center of rotation: ", rot_center)
47
48     proj = tomopy.minus_log(proj)
49
50     # Reconstruct object using Gridrec algorithm.
51     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
52
53     # Mask each reconstructed slice with a circle.
54     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
55
56     # Write data as stack of TIFFs.
57     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.11 APS 2-BM & 32-ID

This section contains a script to read the APS 2-BM and 32-ID tomography dataset and reconstruct it with tomoPy.

Download file: [rec_aps_32id_full.py](#)

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct TXM data set.
6  """
7
8  from __future__ import print_function
9  import tomopy
10 import dxchange
11
12 if __name__ == '__main__':
13
14     # Set path to the micro-CT data to reconstruct.
15     fname = 'data_dir/sample.h5'

```

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```

16
17     # Select sinogram range to reconstruct.
18     start = 0
19     end = 16
20
21     # Read APS 32-ID raw data.
22     proj, flat, dark, theta = dxchange.read_aps_32id(fname, sino=(start, end))
23
24     # If data collection angles is not defined in the hdf file then set it as equally_
↳ spaced between 0-180 degrees.
25     if (theta is None):
26         theta = tomopy.angles(proj.shape[0])
27     else:
28         pass
29
30     # Flat-field correction of raw data.
31     proj = tomopy.normalize(proj, flat, dark)
32
33     # Find rotation center.
34     rot_center = tomopy.find_center(proj, theta, ind=0, init=1024, tol=0.5)
35     print("Center of rotation: ", rot_center)
36
37     proj = tomopy.minus_log(proj)
38
39     # Reconstruct object using Gridrec algorithm.
40     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
41
42     # Mask each reconstructed slice with a circle.
43     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
44
45     # Write data as stack of TIFs.
46     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.12 Petra III P05

This section contains a script to read the Petra III P05 tomography dataset and reconstruct it with tomoPy.

Download file: [rec_petraIII.py](#)

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the PetraIII P05 tomography data as original_
↳ tiff.
6  """
7
8  from __future__ import print_function
9  import tomopy
10 import dxchange
11
12 if __name__ == '__main__':
13
14     # Set path to the micro-CT data to reconstruct.
15     fname = '/data_dir/sample_name00_0000/'

```

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```

16
17     proj_start = 0
18     proj_end = 1441
19     flat_start = 0
20     flat_end = 20
21     dark_start = 0
22     dark_end = 20
23
24     ind_tomo = range(proj_start, proj_end)
25     ind_flat = range(flat_start, flat_end)
26     ind_dark = range(dark_start, dark_end)
27
28     # Select the sinogram range to reconstruct.
29     start = 0
30     end = 16
31
32     # Read the Petra III P05
33     proj, flat, dark = dxchange.read_petraIII_p05(fname, ind_tomo, ind_flat, ind_dark,
↪     sino=(start, end))
34
35     # Set data collection angles as equally spaced between 0-180 degrees.
36     theta = tomopy.angles(proj.shape[0])
37
38     # Flat-field correction of raw data.
39     proj = tomopy.normalize(proj, flat, dark)
40
41     # Find rotation center.
42     rot_center = tomopy.find_center(proj, theta, init=1024, ind=0, tol=0.5)
43     print("Center of rotation: ", rot_center)
44
45     proj = tomopy.minus_log(proj)
46
47     # Reconstruct object using Gridrec algorithm.
48     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
49
50     # Mask each reconstructed slice with a circle.
51     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
52
53     # Write data as stack of TIFs.
54     dxchange.write_tiff_stack(rec, fname='recon_dir/petra_')

```

3.3.13 SLS Tomcat

This section contains a script to read the Swiss Light Source tomcat tomography dataset and reconstruct it with tomoPy.

Download file: `rec_tomcat.py`

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the Swiss Light Source TOMCAT tomography
6  data as original tiff.
7  """
8

```

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```

9  from __future__ import print_function
10 import tomopy
11 import dxchange
12
13 if __name__ == '__main__':
14     # Set path to the micro-CT data to reconstruct.
15     fname = 'data_dir/sample_name_prefix'
16
17     # Select the sinogram range to reconstruct.
18     start = 0
19     end = 16
20
21     # Read the APS 1-ID raw data.
22     proj, flat, dark = dxchange.read_sls_tomcat(fname, sino=(start, end))
23
24     # Set data collection angles as equally spaced between 0-180 degrees.
25     theta = tomopy.angles(proj.shape[0], 0, 180)
26
27     # Flat-field correction of raw data.
28     proj = tomopy.normalize(proj, flat, dark)
29
30     # Find rotation center.
31     rot_center = tomopy.find_center(proj, theta, init=1024,
32                                     ind=0, tol=0.5)
33     print("Center of rotation:", rot_center)
34
35     proj = tomopy.minus_log(proj)
36
37     # Reconstruct object using Gridrec algorithm.
38     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
39
40     # Mask each reconstructed slice with a circle.
41     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
42
43     # Write data as stack of TIFs.
44     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')

```

3.3.14 X-radia XRM

This section contains a script to read the X-radia XRM tomography dataset and reconstruct it with tomoPy.

Download file: [rec_xradia_xrm.py](#)

```

1  #!/usr/bin/env python
2  # -*- coding: utf-8 -*-
3
4  """
5  TomoPy example script to reconstruct the xrm tomography data from
6  the original stack of xrm. To use rename the xrm data as
7  radios/image_00000.xrm and flats/ref_00000.xrm
8  """
9
10 from __future__ import print_function
11 import tomopy
12 import dxchange

```

(continues on next page)

```
13
14 if __name__ == '__main__':
15     # Set path to the micro-CT data to reconstruct.
16     fname = 'data_dir/'
17
18     proj_start = 0
19     proj_end = 1800
20     flat_start = 0
21     flat_end = 100
22
23     ind_tomo = range(proj_start, proj_end)
24     ind_flat = range(flat_start, flat_end)
25
26     # Select the sinogram range to reconstruct.
27     start = 0
28     end = 16
29
30     # APS 26-ID has an x-radia system collecting raw data as xrm.
31     proj, flat, metadata = dxchange.read_aps_26id(fname, ind_tomo, ind_flat,
32                                                sino=(start, end))
33
34     # make the darks
35     dark = np.zeros((1, proj.shape[1], proj.shape[2]))
36
37     # Set data collection angles as equally spaced between 0-180 degrees.
38     theta = tomopy.angles(proj.shape[0])
39
40     # Flat-field correction of raw data.
41     proj = tomopy.normalize(proj, flat, dark)
42
43     # Find rotation center.
44     rot_center = tomopy.find_center(proj, theta, init=1024,
45                                   ind=0, tol=0.5)
46     print("Center of rotation: ", rot_center)
47
48     proj = tomopy.minus_log(proj)
49
50     # Reconstruct object using Gridrec algorithm.
51     rec = tomopy.recon(proj, theta, center=rot_center, algorithm='gridrec')
52
53     # Mask each reconstructed slice with a circle.
54     rec = tomopy.circ_mask(rec, axis=0, ratio=0.95)
55
56     # Write data as stack of TIFFs.
57     dxchange.write_tiff_stack(rec, fname='recon_dir/recon')
```

For a repository of experimental and simulated data sets please check [TomoBank \[B4\]](#).

3.4 Credits

3.4.1 Citations

We kindly request that you cite the following article [\[A1\]](#) if you use DXchange.

3.4.2 References

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