

Manual for Vitrealab Light Chips Evaluation Code

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Overview

This project is used to evaluate the output of Vitrealab light chips. It aims to extract the tilt angles (`tilt_x`, `tilt_y`) and beam divergence (`beam_div_x`, `beam_div_y`) for each beam in the beam array.

1 Class Descriptions

1.1 Tomography

Contains all the acquired images.

Attributes:

- `filename` - File location and name.
- `directory` - Current working directory.
- `shape` - Shape of the beam array (rows, cols).
- `roi_width` - Width of the region of interest.
- `cross_sect_image_l` - List with cross-section images.
- `cross_sect_z_l` - List with z coordinates of cross-sections.
- `cross_sect_l` - List with cross-section objects.
- `n_sections` - Number of cross sections.
- `z_diff` - Z difference between cross-sections.
- `pixel_size` - Pixel size in meters.
- `beam_l` - List with all beam objects.
- `max_z_fit` - Maximum z coordinate for fit.
- `max_z_idx_fit` - Index of the maximum z coordinate for fit.

Methods:

- `__init__` - Initializes the Tomography measurement.
- `__str__` - String representation.
- `__repr__` - Representation of the object.
- `load_data` - Loads images and z coordinates.
- `find_rot_spacing` - Finds rotation angle and grid spacing.
- `init_coords` - Initializes beam coordinates.
- `complete_beam_coords` - Completes beam coordinates for all sections.
- `complete_all_beams_coords` - Iteratively completes all beam coordinates.

- `plot_cross_section` - Plots cross-sections with ROIs.
- `set_max_z` - Sets the maximum z-value for fitting.
- `find_dir_cos` - Finds direction cosines for beams.

1.2 Cross_Section

Contains image and rotated image, and z-coordinate of respective cross-section.

Attributes:

- `z_coord` - Z coordinate of the cross-section.
- `shape` - Shape of the cross-section.
- `image` - Image of the cross-section.
- `spacing_px` - Spacing in pixels.
- `spacing_mm` - Spacing in millimeters.
- `rot_angle` - Rotation angle.
- `image_rot` - Rotated image.
- `beam_coord_l` - List of beam coordinates.

Methods:

- `__init__` - Initializes the cross-section.
- `__str__` - String representation.
- `__repr__` - Representation of the object.
- `simple_plot` - Plots the cross-section.
- `find_rot` - Finds the optimal rotation angle.
- `find_peaks` - Finds the peaks in the cross-section.
- `find_geom` - Finds geometric properties of the beam disposition.
- `id_to_coord` - Converts beam index to coordinates.

1.3 Beam

Contains beam information including position, tilt, and divergence.

Attributes:

- `id_x, id_y` - Beam identifiers.
- `beam_coord_l` - List of beam centroid coordinates.
- `beam_width_l` - List of beam widths.
- `roi_l` - List of regions of interest for each beam.
- `div_full_angle` - Full angle of beam divergence.
- `e_x, e_y, e_z` - Direction cosines.

Methods:

- `__init__` - Initializes the beam.
- `__repr__` - Representation of the object.
- `find_coords` - Finds the coordinates of the beam.
- `find_dir_cos` - Finds the direction cosines of the beam.
- `find_div` - Finds the divergence of the beam.
- `plot_trajectory` - Plots the trajectory of the beam.
- `plot_width` - Plots the width of the beam.
- `plot_rois` - Plots regions of interest of the beam.