

# SNRS - Extraction of source strips calibrated 3D geometry data from LTD datasets

**Author:** F.Mauger

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The SNRS package contains some tools to build calibrated 3D geometry datasets from the *laser tracker* raw data described in DocDB #5400.

Programs:

- `snrs-build-ltd` : parser for the raw LTD datasets and generation of calibrated LTD datasets in the SuperNEMO/Falaise frame
- `build-ltd.bash` : wrapper script to automate the launch of the `snrs-build-ltd` executable for a set of selected source strips
- `plot_ltd_strip.gp` : Gnuplot script to generate images of the LTD datasets for selected source strips

## Building calibrated 3D geometry data from LTD datasets

### 1. Preparing the setup:

- Define the path to the raw LTD datasets:

```
$ export RAW_LTD_DATA_DIR="/data/SuperNEMO/RealSources/3D_measurements/source_foils"
```

- Define the path to the SNRS data base directory where high-level generated data files will be stored:

```
$ export SNRS_DATA_DIR="/data/SuperNEMO/snrs_data"
```

### 2. Run the individual source strips' LTD data builder (ITEP strip model only):

```
$ ./scripts/build-ltd.bash
```

### 3. The datafiles containing the measurements of the fiducial edge for each strip are stored in : `resources/data/geometry/source_foils/ltd`.

### 4. Generated LTD datasets are stored in `${SNRS_DATA_DIR}/geometry/source_foils/ltd`:

```
$ cat ${SNRS_DATA_DIR}/geometry/source_foils/ltd/processed-strips.lis
...
$ find ${SNRS_DATA_DIR}/geometry/source_foils/ltd -maxdepth 1 -name "strip-*" -exec basename \{\} \;
ltd-strip-2.dat
ltd-strip-3.dat
...
ltd-strip-32.dat
ltd-strip-33.dat
ltd-strip-34.dat
```

### Comments on the format:

- This is an ASCII raw format which can be parsed using the `snrs::ltd::load` method to fill a `snrs::ltd` instance.
- The generated files contains the list of selected laser tracker points associated to the specific source strip. Coordinates are expressed in the SuperNEMO/Falaise frame (unit: mm). Each point is also given a local density weight.

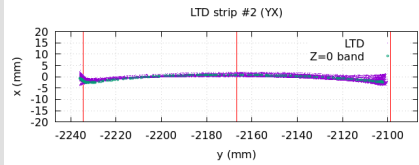
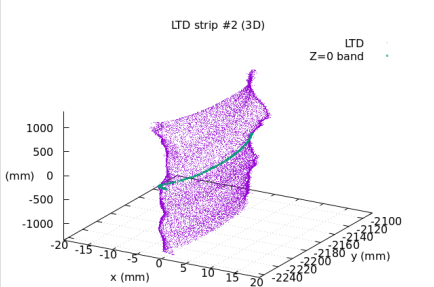
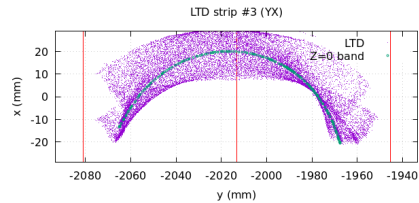
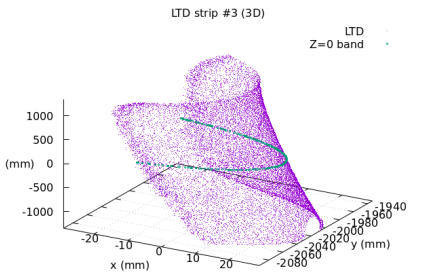
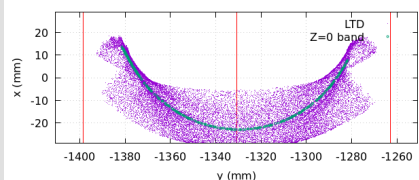
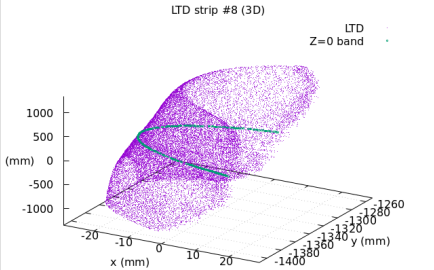
- Some voxelization data are also stored in the file (voxel size: 1cm x 1cm x 1cm).
- TODO: Consider to process source strips with LAPP layout**  
(8-pads strips) is needed.

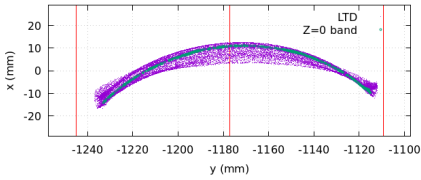
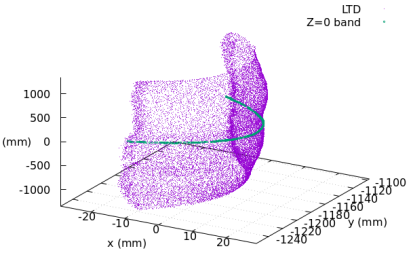
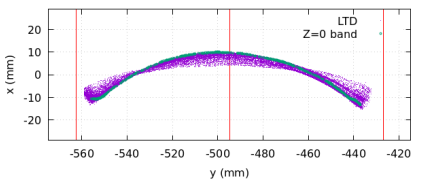
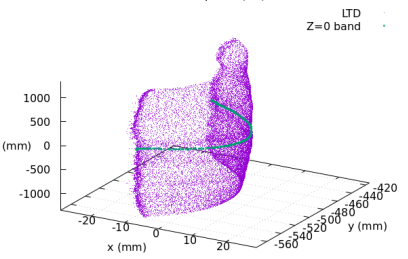
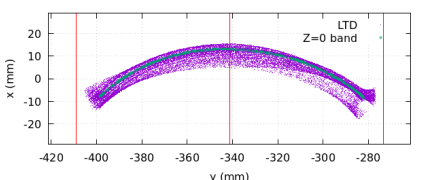
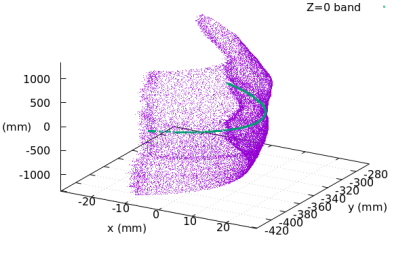
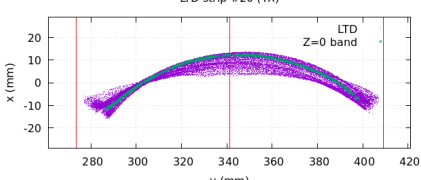
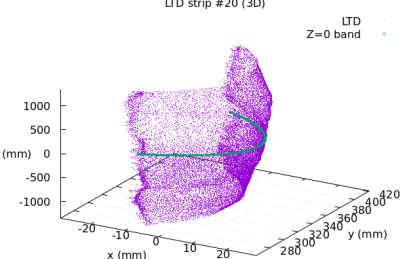
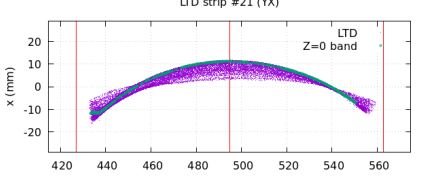
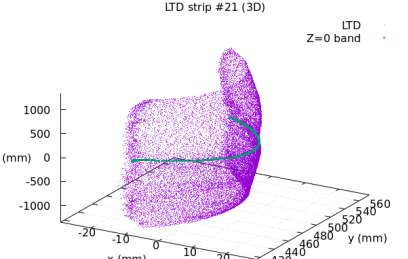
5. Generate documentation:

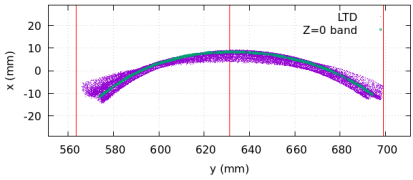
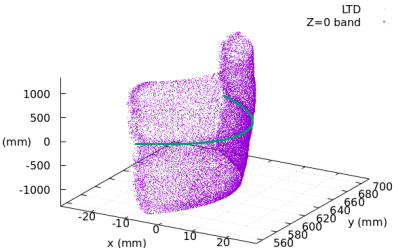
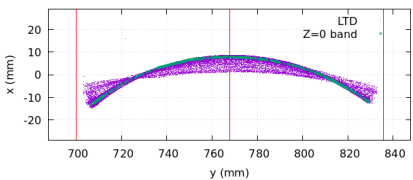
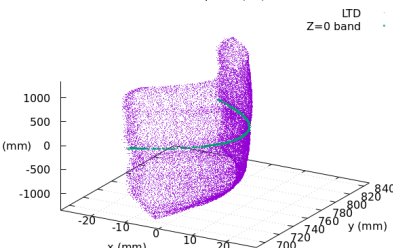
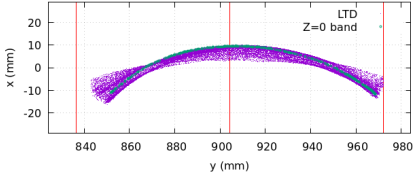
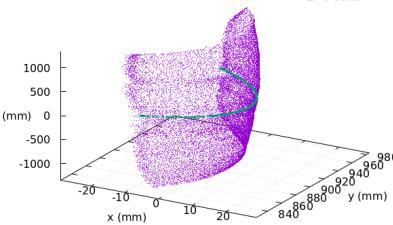
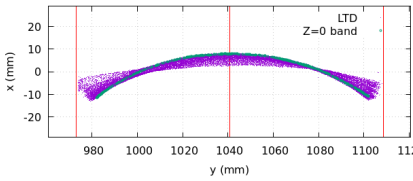
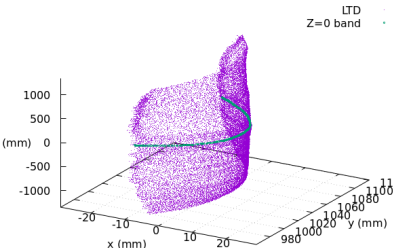
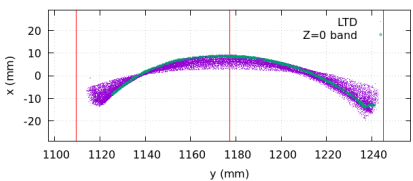
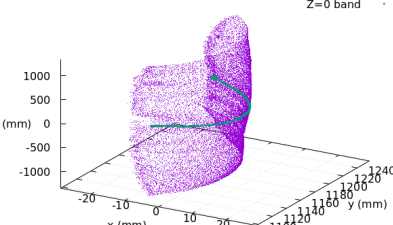
```
$ make docBuildLtd
```

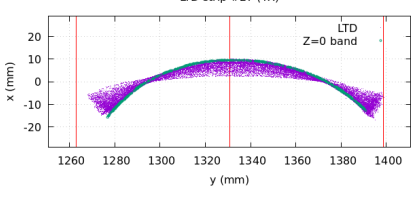
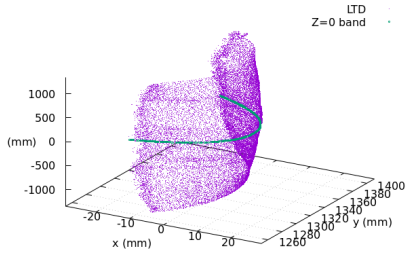
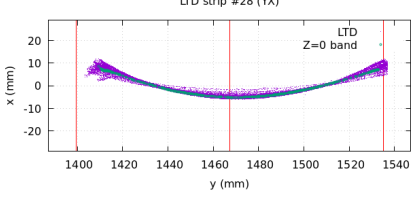
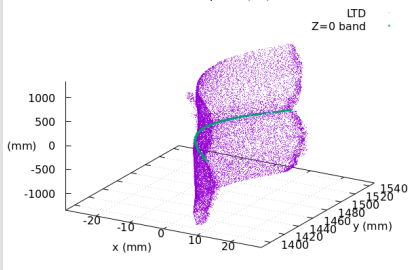
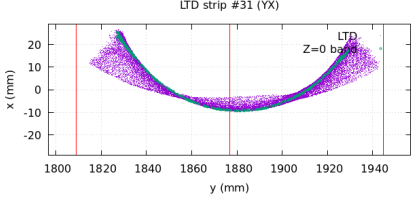
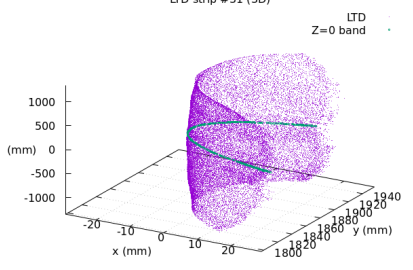
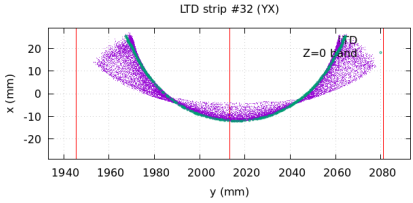
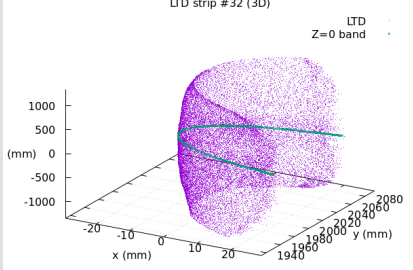
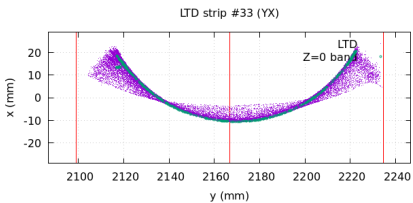
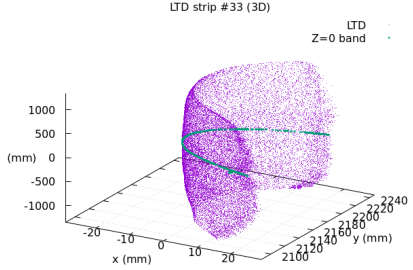
## Individual per source strip datasets

- Plot data (CSV ASCII format) and images files are generated in the `${SNRS_DATA_DIR}/geometry/source_foils/ltd/images` directory.
- The set of points is displayed in the SuperNEMO/Falaise frame and a special Z-band ( $Z=0$ ,  $DZ=1$  mm) is highlighted to illustrate the ability of the `snrs::ltd` class to select subsets of laser tracker points as an input for a fit algorithm (see `snrs::fsfs` class).
- For now, we provide only the result of the processing of source strips of the ITEP layout (large single bands).

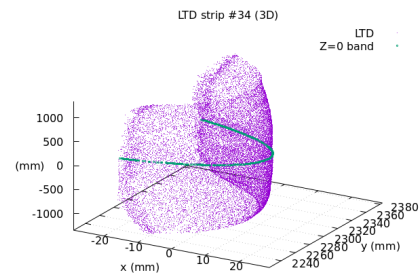
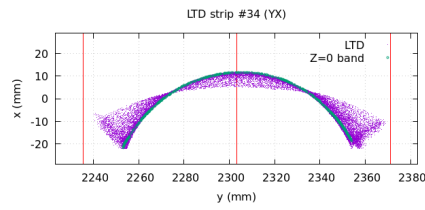
Strip	Top view	3D view
2		
3		
8		

9	<p>LTD strip #9 (YX)</p> 	<p>LTD strip #9 (3D)</p> 
14	<p>LTD strip #14 (YX)</p> 	<p>LTD strip #14 (3D)</p> 
15	<p>LTD strip #15 (YX)</p> 	<p>LTD strip #15 (3D)</p> 
20	<p>LTD strip #20 (YX)</p> 	<p>LTD strip #20 (3D)</p> 
21	<p>LTD strip #21 (YX)</p> 	<p>LTD strip #21 (3D)</p> 

22	<p>LTD strip #22 (YX)</p> 	<p>LTD strip #22 (3D)</p> 
23	<p>LTD strip #23 (YX)</p> 	<p>LTD strip #23 (3D)</p> 
24	<p>LTD strip #24 (YX)</p> 	<p>LTD strip #24 (3D)</p> 
25	<p>LTD strip #25 (YX)</p> 	<p>LTD strip #25 (3D)</p> 
26	<p>LTD strip #26 (YX)</p> 	<p>LTD strip #26 (3D)</p> 

27	<p>LTD strip #27 (YX)</p> 	<p>LTD strip #27 (3D)</p> 
28	<p>LTD strip #28 (YX)</p> 	<p>LTD strip #28 (3D)</p> 
31	<p>LTD strip #31 (YX)</p> 	<p>LTD strip #31 (3D)</p> 
32	<p>LTD strip #32 (YX)</p> 	<p>LTD strip #32 (3D)</p> 
33	<p>LTD strip #33 (YX)</p> 	<p>LTD strip #33 (3D)</p> 

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## Comments

- Strip #2 shows a significant asymmetric deformation at  $Z \sim 51$  cm (elliptic fit should not work in this zone). The amplitude of the transverse deformation is somewhat limited (a few millimeters) compared to other ITEP-shaped strips.