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

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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 lauch 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 fiducal 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).

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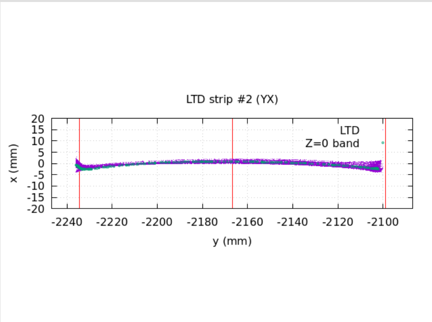
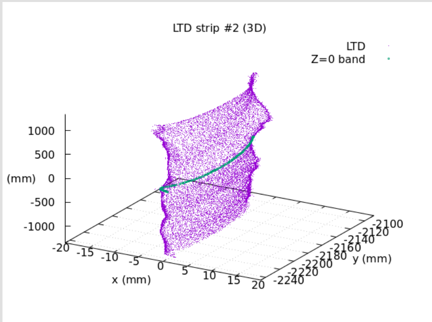
<tr><td>2</td><td>
</td><td>
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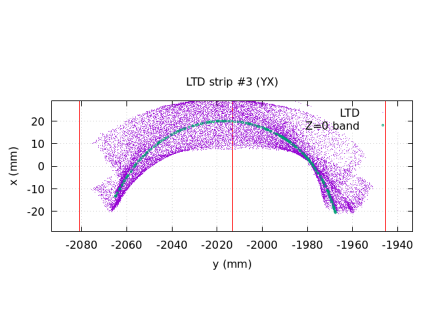
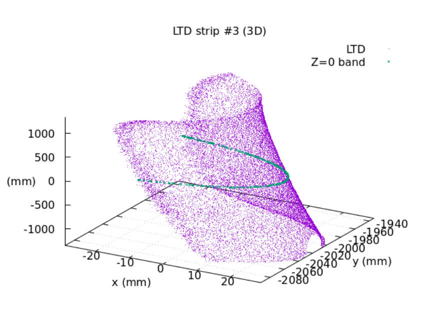
<tr><td>3</td><td>
</td><td>
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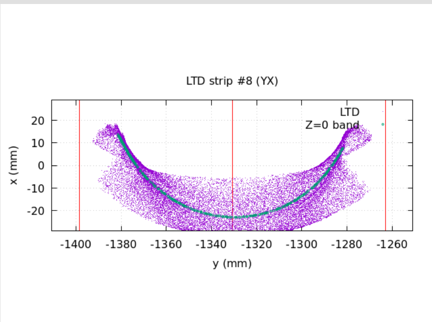
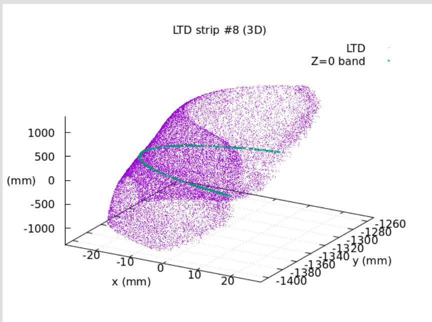
<tr><td>8</td><td>
</td><td>
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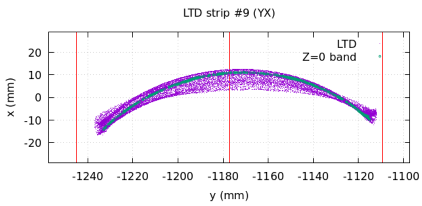
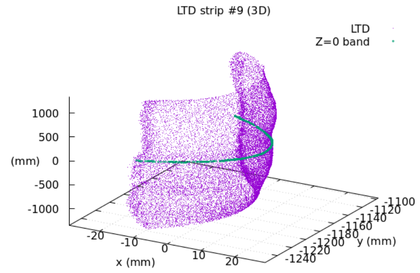
<tr><td>9</td><td>
</td><td>
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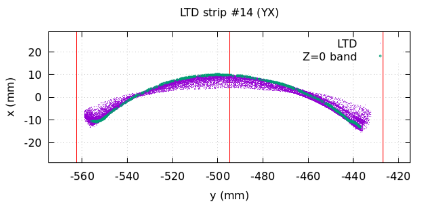
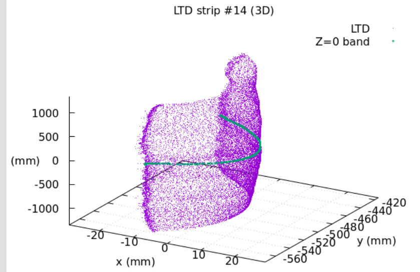
<tr><td>14</td><td>
</td><td>
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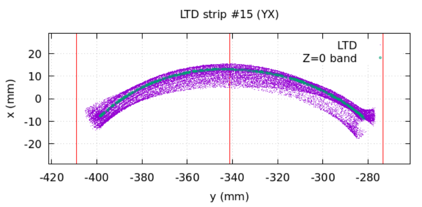
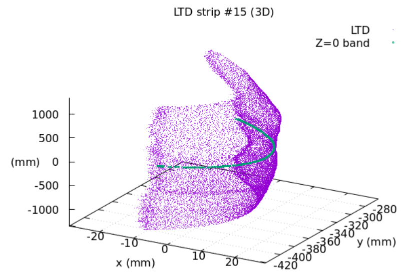
<tr><td>15</td><td>
</td><td>
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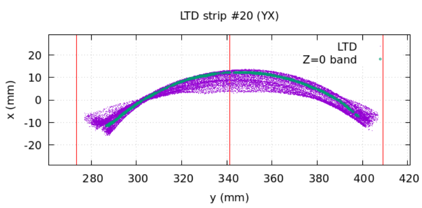
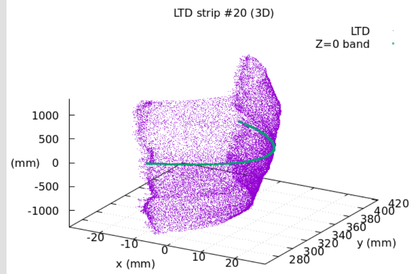
<tr><td>20</td><td>
</td><td>
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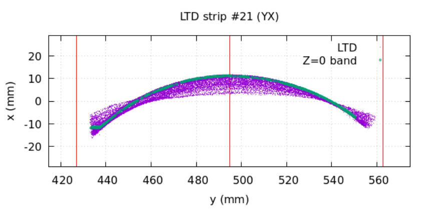
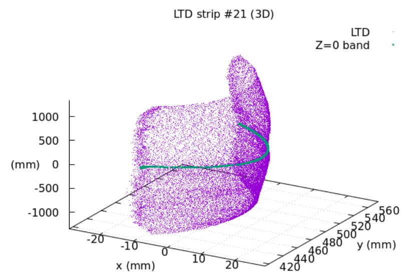
<tr><td>21</td><td>
</td><td>
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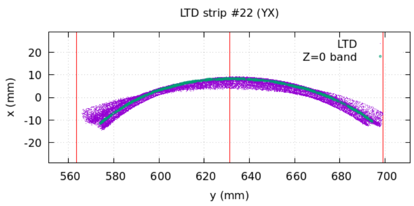
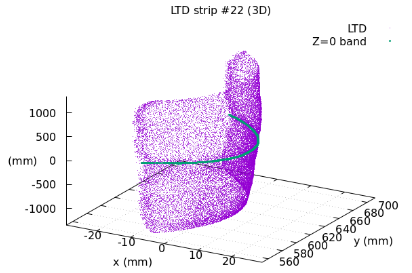
<tr><td>22</td><td>
</td><td>
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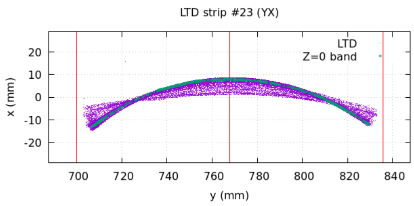
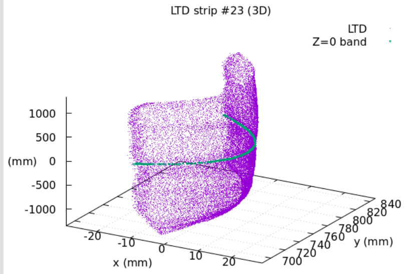
<tr><td>23</td><td>
</td><td>
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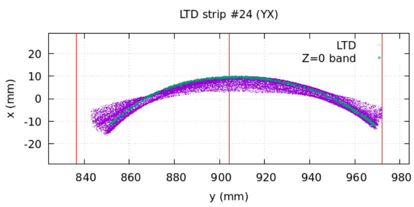
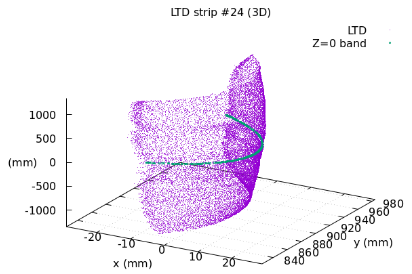
<tr><td>24</td><td>
</td><td>
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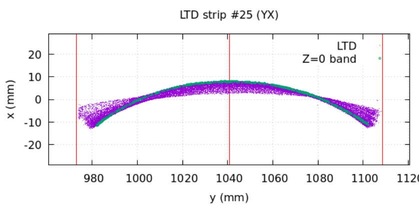
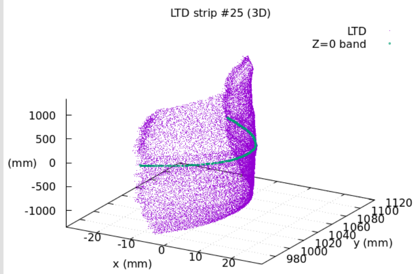
<tr><td>25</td><td>
</td><td>
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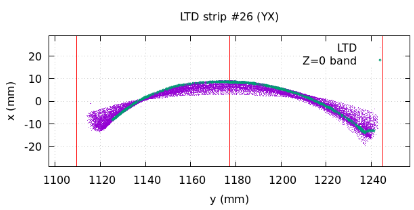
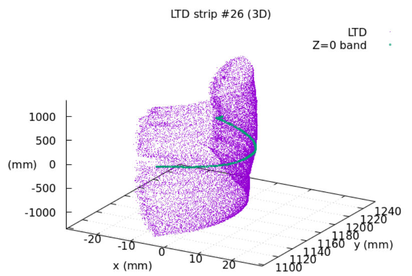
<tr><td>26</td><td>
</td><td>
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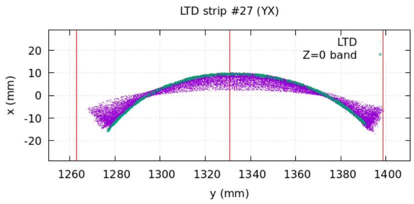
<td>
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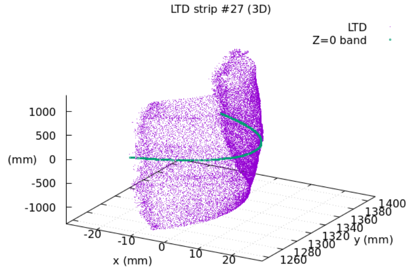
<td>
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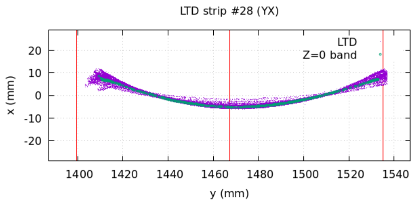
<td>
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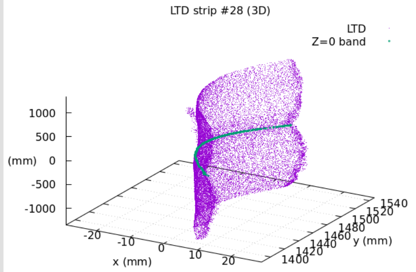
<td>
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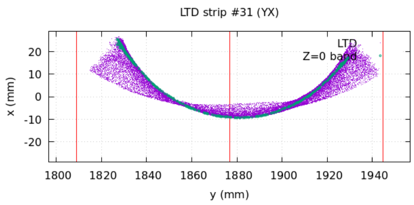
<td>
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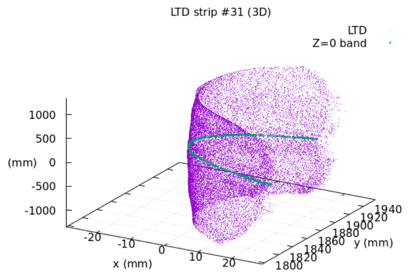
<td>
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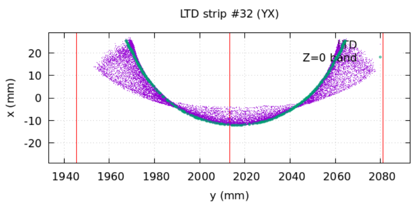
<td>
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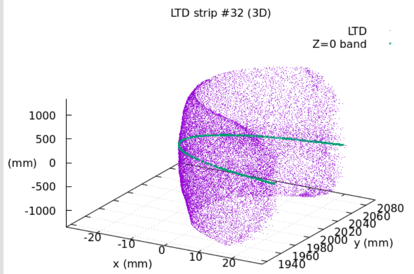
<td>
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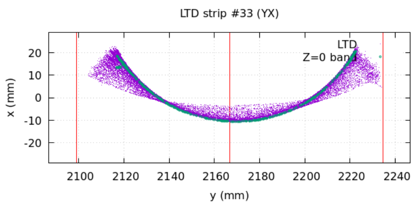
<td>
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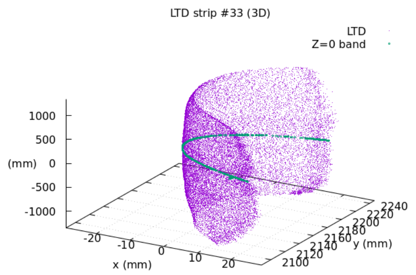
<td>
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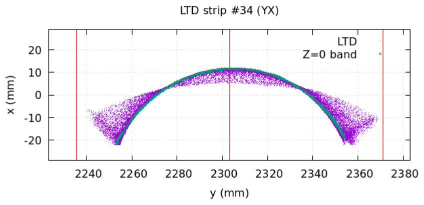
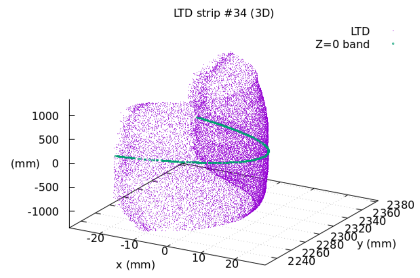
34		

Comments

- Strip #2 shows a significant asymmetric deformation at Z ~ 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.