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|                                                                                                                                                                                                                                                                                                                                                   | <b>Experiment title:</b><br>Structural investigation of incommensurate phases of 1T-TaS <sub>2</sub> at the 100-600 K temperature range | <b>Experiment number:</b><br>01-02-1170 |
| <b>Beamline:</b><br>CRG<br>beamline<br>BM01<br>SNBL                                                                                                                                                                                                                                                                                               | <b>Date of experiment:</b><br>from: 28.10.2017 to: 31.10.2017                                                                           | <b>Date of report:</b><br>16.02.2018    |
| <b>Shifts: 9</b>                                                                                                                                                                                                                                                                                                                                  | <b>Local contact(s):</b> Vadim Dyadkin                                                                                                  | <i>Received at ESRF:</i>                |
| <b>Names and affiliations of applicants (* indicates experimentalists):</b><br><b>Alla Arakcheeva; EPFL, LPMC, IPHYS Lausanne Switzerland</b><br><b>Anastasia Glushkova; EPFL, LPMC, IPHYS Lausanne Switzerland</b><br><b>Sergiy Katrych; EPFL, LPMC, IPHYS Lausanne Switzerland</b><br><b>Luka Cirik; EPFL, LPMC, IPHYS Lausanne Switzerland</b> |                                                                                                                                         |                                         |

### Report:

Using Cryostream 700+ nitrogen blower device, a few single crystals and powder samples of 1T-TaS<sub>2</sub> have been tested and measured at the 80 - 500 K temperature with the "heating" and "cooling" treatments.

Using a helium blower system the powder diffraction data have been collected at the 4 - 300 K.

Each single crystal was checked for twinning. Unfortunately, no untwined single crystal has been found.

The following single crystal data collections have been saved for our analysis:

- At T = 260, 245, 230, 215, 200, 185, 170, 155, 140, 125, 110, 095 K with the "cooling" way.
- At T = 80, 95, 110, 125, 140, 155, 170, 185, 200, 215, 230, 245, 260, 275, 290 K with the "heating" way.

The following powder diffraction data collections have been saved for our analysis:

- From T = 4 K up to T = 300 K and from 300 down to 4 K with step of 2 K
- From T = 300 K up to T = 500 K with the step of 0.5 K

– From  $T = 500$  K down to  $T = 300$  K with the step of 0.5 K  
Preliminary analysis of the low-temperature (LT) data collections confirms an expected unsymmetrical sequence of the LT phase transformations but with a few unexpected states of the sample (Fig. 1).

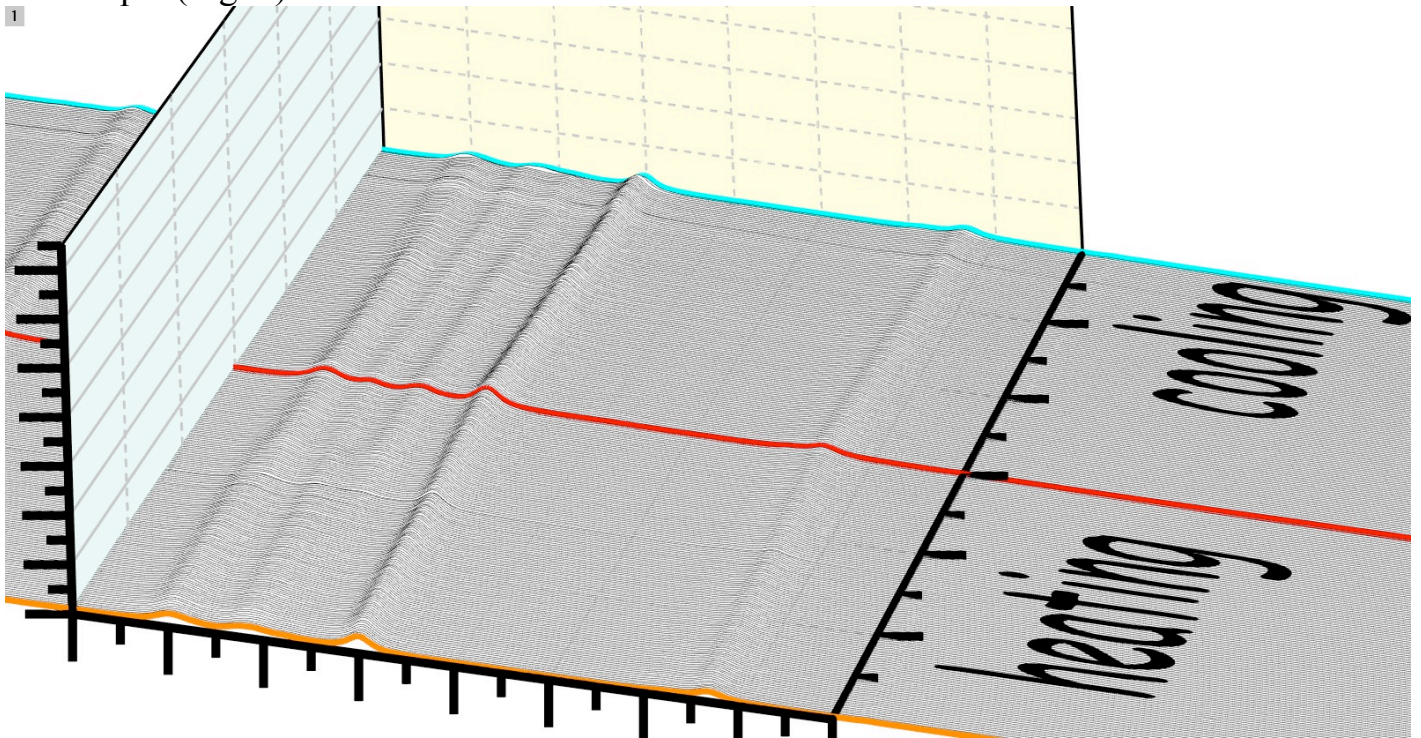


Fig.1. The low-temperature phase transformations of 1T-TaS<sub>2</sub>. The red line corresponds to 300 K. The blue and yellow lines correspond to 4 K reached at the cooling and heating sample states.

**Analysis is in a progress.**