ESRF	**Experiment title:** X-ray holography on small crystals and MBE grown alloys.	**Experiment number:** MI-326
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Report:

The aim of this experimental run was: (i) technical development of the methodology; (ii) study of the chemical short range order in epitaxially grown thin films; (iii) study of very small samples with arbitrary shape.

During our previous experiment (MI272) we developed a new data collection system capable of measuring a full hologram of up to 6 10^5 data points within one minute. However, vibrations of the monochromator due to the new cooling system, did not allow to measure the small holographic signal. In this run, the monochromator vibration was acceptable for our measurement. Using this setup we took holograms of two FePt epitaxial layers at 4 energies. Preliminary evaluation of these measurements completed in the following experiment (MI377) using the pink beam, shows that different chemical short range order in the two samples can be distinguished (Fig 1).

In order to further develop the technique we wanted to study small samples with arbitrary shape. We measured first a 100 μm diameter ball of $SrTiO_3$. The count rate was 10^6/sec which allowed to take a hologram within a few hours. However, due to the relatively large sample size and the non-perfect spherical shape of the sample, absorption effects masked the holographic signal. We estimated that a reduction in the sample size by one order of magnitude would be enough to reduce the above unwanted effects to an acceptable level. The loss of intensity because of the small sample size could be compensated by using a pink

undulator beam without additional monochromatization. Further increase of the intensity could be reached by introducing a refractive focusing lens.

In order to test the holography setup for the following experiment, we carried out measurements with a new detection system using a diode in current mode. The system functioned according to our expectations, however, further improvment of the cable's shielding and amplifier stability is necessary.

At the end of the experimental run, we could accomplish our earlier plan (MI272): the imaging of light atoms. From the above work, together with measurements (MI377), two articles are in preparation.
We refer to MI377 experimental report for further details on these results.

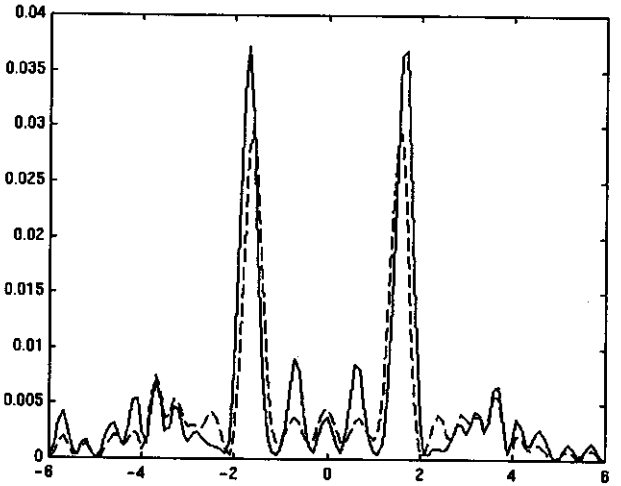

Fig 1. Intensity of the holographic reconstruction of the in-plane first neighbours of Pt atoms using 8 energies. The different height of the peaks for the ordered (solid line) and disordered (dashed line) samples is related to the short range order of the systems.