EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

ESRF

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office using the **Electronic Report Submission Application:**

http://193.49.43.2:8080/smis/servlet/UserUtils?start

Reports supporting requests for additional beam time

Reports can now be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.

ESRF	**Experiment title:** Highly asymmetric Laue diffraction (sagittally focusing Laue monochromator)	**Experiment number**: MI 922
Beamline: BM05	**Date of experiment**: from: 07.05.2008 to: 12.05.2008	**Date of report**: 30.5.2008
Shifts: 10	**Local contact(s): MSc. Peter Oberta**	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

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Report:

The experiment was devoted to study properties of a double surface-shaped Laue-diffracting monochromator. The possibility of sagittal focusing of SR by an asymmetric Laue crystal with profiled surface was experimentally demonstrated in our last experiments MI – 751 and MI – 848. This time we used two identical samples of Si single crystals with two parallel holes of the diameter of 8 mm (Fig. 1) in a dispersive arrangement. The axes of the holes formed an angle of 7.95° with (111) diffracting planes. The minimum thickness of this Laue crystal was 0.5 mm.The 15.35 keV SR was diffracted in the space between the holes. The impinging and diffracted beam formed the angle of 0.55° with the local surface. The diffracted beam entered the second crystal under the same angle and was diffracted as well. The dispersive setting was used in the goal of canceling both the vertical and horizontal spread of the focus observed in the previous experiment. We observed a diffraction with a focusing effect (convergent beam) after the first crystal and after the second crystal separately. In our last experiment (MI – 848) we observed several interesting scattering effects (see MI – 848 report). During this experiment we could repeat these parasitic scatterings and explain them. In figure 2 we can see two such „scattering centers“ which are created due to total reflection of the incident beam. The interference fringes which we observed in the last experiment were created by the surface inhomogenities due to the drilling process. The low incident angle (0.55°) is very sensitive to sufrece inhomogenities. After we polished the surface again, the interference fringes disapeared. We wasn´t able to observe the diffraction after two crystal, because from the total impinging radiation after two 0.5 mm thick Si crystals and 150 cm of air just 9% remained. Considering the background radiation, the used CCD camera wasn´t sensitive enough the register the diffraction, which was in the last experiment observed. Futhermore we observed a double difraction, which was due to higher harmonics, figure 3. Even we de-tuned the monochromator by 20%, we observed the higher harmonics. This gives the possibility to study a new kind of harmonics rejection based on diffractive – refractive optics. Furthemore we will simulate with help of ray-tracing programs the calculated focus and compare it with the CCD images we obtained.

Fig. 1

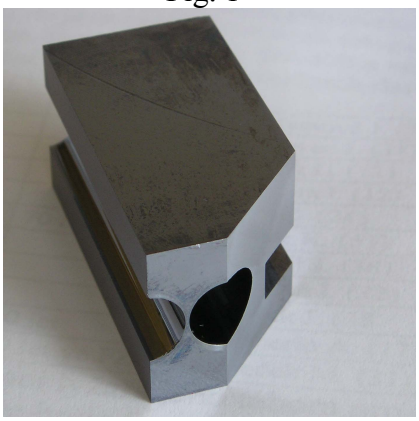

Fig. 2

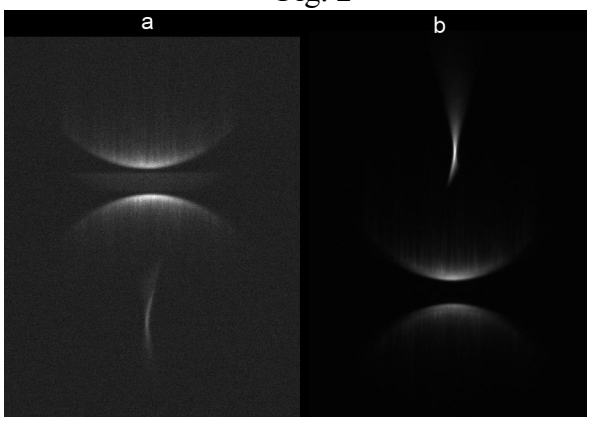

Fig. 3