

## 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 via the User Portal:

<https://www.esrf.fr/misapps/SMISWebClient/protected/welcome.do>

### ***Reports supporting requests for additional beam time***

Reports can 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.



	<b>Experiment title:</b> Temperature dependant X-ray diffraction measurements of decagonal Al-Cu-Rh and Al-Cu-Ir quasicrystals	<b>Experiment number:</b> HS 4694
<b>Beamline:</b> BM 01A	<b>Date of experiment:</b> from: 04/10/2012 to: 06/10/2012	<b>Date of report:</b> 08/02/2014
<b>Shifts:</b> 9	<b>Local contact(s):</b> Vadim Diadkin	<i>Received at ESRF:</i>
<b>Names and affiliations of applicants</b> (* indicates experimentalists): Prof. Walter Steurer Dr. Thomas Weber Dr. Pawel Kuczera* Laboratory of Crystallography, ETH Zurich, Switzerland.		

### Report:

An article based on the experimental results is in press (page numbers not assigned yet, but the **doi** number is fixed).

Kuczera, P., Wolny, J. & Steurer, W. *High-temperature structural study of decagonal Al-Cu-Rh* (2014) *Acta Cryst.* **B70**, doi:10.1107/S2052520613032575

### Abstract:

The structure of decagonal Al-Cu-Rh has been studied as a function of temperature by in-situ single-crystal X-ray diffraction in order to contribute to the discussion on energy or entropy stabilization of quasicrystals. The experiments were performed at 293, 1223, 1153, 1083 and 1013 K. A common subset of 1460 unique reflections was used for the comparative structure refinements at each temperature. A comparison of the high-temperature datasets suggests that the best quasiperiodic ordering should exist between 1083 and 1153 K. However, neither the refined structures vary significantly with temperature nor the phasonic displacement parameter. This indicates that the phasonic contribution to entropy does not seem to play a major role in the stability of this decagonal phase in contrast to other kinds of structural disorder, which suggests that, in this respect, this decagonal phase would be similar to other complex intermetallic high-temperature phases.

### Comments:

The results on Al-Cu-Ir decagonal quasicrystals are not yet conclusive. We will submit a follow-up proposal to perform additional experiments on this phase. Within the new project we will also try to investigate the HT stability of icosahedral quasicrystals.