



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>

Deadlines for submission of Experimental Reports

Experimental reports must be submitted within the period of 3 months after the end of the experiment.

Experiment Report supporting a new proposal (“relevant report”)

If you are submitting a proposal for a new project, or to continue a project for which you have previously been allocated beam time, you must submit a report on each of your previous measurement(s):

- even on those carried out close to the proposal submission deadline (it can be a “*preliminary report*”),
- even for experiments whose scientific area is different from the scientific area of the new proposal,
- carried out on CRG beamlines.

You must then register the report(s) as “relevant report(s)” in the new application form for beam time.

Deadlines for submitting a report supporting a new proposal

- 1st March Proposal Round - **5th March**
- 10th September Proposal Round - **13th September**

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.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report in English.
- include the experiment number 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.



	Experiment title: Probing the wave vector dependence of atomic motion of glass-formers across the glass transition	Experiment number: HC 4260
Beamline: ID10	Date of experiment: from: 04.11.2020 to: 08.11.2020	Date of report: 13.09.2021
Shifts: 18	Local contact(s): Federico Zontone	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Maximilian Frey Professor Ralf Busch Dr. Isabella Gallino *Mle Beatrice Ruta Nico Neuber		

Report:

Aim of the experiment was to take advantage of the high coherent flux of the ID10 beamline after the newest upgrade and to make use of large area photon counting detectors such as the EIGER 4M, to probe the wave vector dependence of the dynamics of metallic glass formers in the liquid as well as the glassy state on a large range of wavevectors (SAXS (0.03-0.5 Å⁻¹) and WAXS (0.5 -3 Å⁻¹). Due to the small signal, especially at smaller angles, an excellent signal, now available with the upgrade at ESRF, is much needed.

For the experiments the compositions Pt/Pd_{42.5}Cu₂₇Ni_{9.5}P₂₁ should be used, due to their high stability against crystallization and a comprising amount of data from previous synchrotron and non-synchrotron experiments that the group can rely on.

Due to the COVID-19 crisis and the limitations that arose from it the experimental group was limited to just one on-site user. Also this experiment was the first of its kind in WAXS geometry that was performed at ID10 after the upgrade. Therefore the beamtime was basically used to commission WAXS XPCS and a large number of problems occurred during the beamtime.

First of all the EIGER 4M, which was an important part of the experiment was not yet available on-site. Therefore we had to switch to the Maxipix 2x2 detector with a much worse performance and it also prevented the work at small angles. Therefore we could only perform some test measurements at wide angles and we had to skip the main goal of the experiment (i.e. the investigation of the dynamics at small Qs). The Maxipix 2x2 does not only possess a smaller area but also a smaller resolution (512 x 512 vs. 2070 x 2167) combined with a smaller contrast. Another huge problem was a large number of spurious oscillations at small as well as large times (compare Fig. 1 and 2) that arised from the oven setup (long times) as well as the monochromator cooling system (at short times).

Moreover, did the bad condition of the monochromator (it is now changed to the best of our knowledge) limit the contrast of the experiment (roughly 1.5 %) even further.

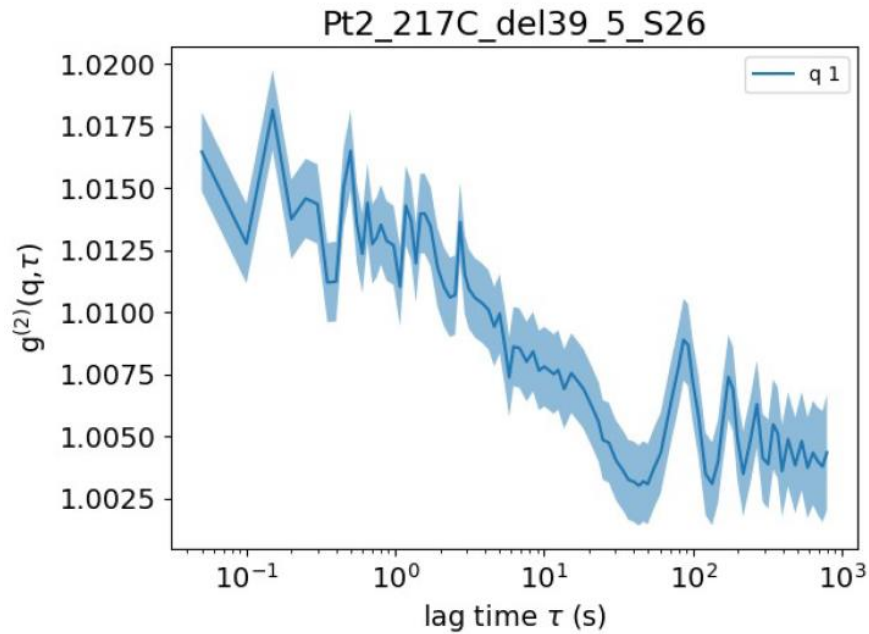


Figure 1 Intensity autocorrelation function measured at the first sharp diffraction peak, revealing the instability of the signal

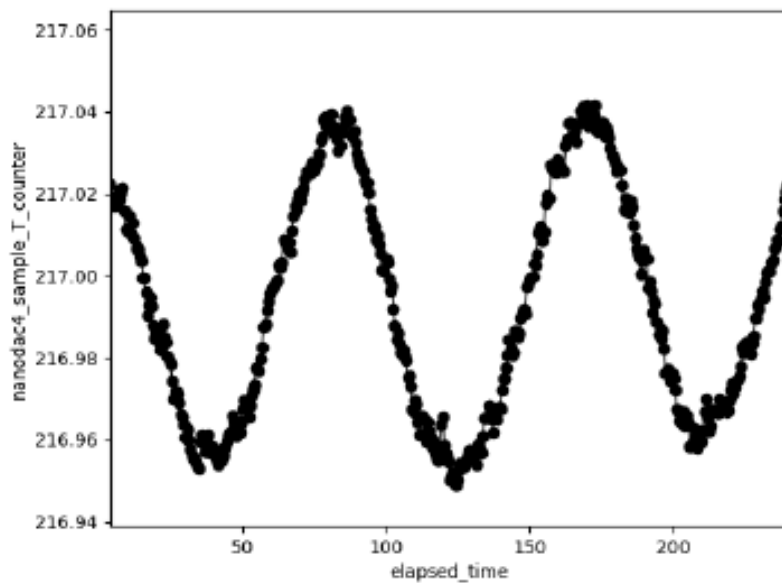


Figure 2 Corresponding temperatur profile of the 'nanodac' controller used for the furnace during the measurement shown in Fig.1. The period (~ 80 s) of the temperature signal matches well with the oscillations on the long time-scale of the intensity autocorrelation function.

In summary the setup in its condition during the time of the operation did not allow to successfully carry out the experiment. Even after a high amount of work in processing of the data after the experiment, the exctration of meaningful and reliable data was not possible. Therefore we have to summarize that the experiment was not successful and we hope to be able to carry out this experiment at a later point.