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 via the User Portal: *https://wwws.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 form 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.

ESRF	**Experiment title:** Multi-scale imaging of mouse liver and its vasculature in cirrhotic and cancerous condition	**Experiment number**: LS2830
Beamline: ID17	**Date of experiment**: from: 29/10/2018 to: 30/10/2018	**Date of report**: 03/09/2019
Shifts: 3	**Local contact(s)**: Herwig Requardt	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

- *__Hugo Rositi, Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, F-63000 Clermont-Ferrand, France__
- __Antoine Vacavant, Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut Pascal, F-63000 Clermont-Ferrand, France__
- *__Françoise Peyrin, CREATIS, Unité CNRS UMR 5220 – INSERM U1206 – Université Lyon 1 – INSA Lyon - Université Jean Monnet Saint-Etienne, Villeurbanne, France.__
- *__Cécile Olivier, CREATIS, Unité CNRS UMR 5220 – INSERM U1206 – Université Lyon 1 – INSA Lyon - Université Jean Monnet Saint-Etienne, Villeurbanne, France.__

Report:

In the proposal, we indicated how we were planning to image mouse liver for future vasculature investigation. Several imaging acquisition parameters were given for good quality imaging based on a first attempt to image mouse liver using phase contrast imaging with Synchrotron radiation on ID19. Among those acquisition parameters, we had identified: energy (26 keV), propagation distance (3 m), high photon flux and voxel size (3,5 µm). Not indicated in the proposal, the beam dimensions is also a critical parameters as it can affect the duration of the scan. On a previous test, beam dimensions was approximately (16 x 16 x 10 mm). Several parameters on ID17 for LS2830 (29/10/2018-30/10/2018) have not been completely fulfilled in regard with the ones stated before. The combination of all those factors has lead to a total number of 6 samples scanned (on a total amount of 15 samples). For further improvements on the beamline, we can list it below:

- Energy: Ideal energy range to observe soft tissues such as hepatic tissues can be considered to be between 19 and 26 keV. On ID17, we could not be under 34 keV without decreasing significantly beam quality.

- Beam dimensions: As stated before, in our application, ideal beam dimensions are (16 x 16 x 10 mm). With ID17 conditions on 29th October, the best we could get was (16x16x3,4 mm). Those dimensions have increasing the number of scans for each sample (10 scans for each sample). When we stated 10 minutes for each sample in the proposal (3 scans of 3minutes), in those conditions, this scanning time has increased to 120 minutes for each sample (10 scans of 12 minutes).

- Interface loss: During the night (around midnight), we have lost control of the MEDTOMO interface. Impossible without appropriate knowledge to relaunch it, which has lead to an early abortion of the experiment (estimated beam loss: 8 hours).

As stated in the introduction of this form, we have been able to image 6 mouse livers in different pathological conditions (healthy, fibrotic, cirrhotic). Those data, even with a more complex post-processing, due to their poor quality (low SNR, motion blur, nearly no signal at the edge of the sample, *etc.*) did not allow us to extract any information about the hepatic vasculature. To illustrate those conditions, we have selected significant and representative snapshots from the data reconstruction we made. As no information nor any added value could have been extracted from those data, we hope, a further beamtime disposal could be offered to us in order to simply respect what we have declared as our goal in the original proposal. Samples are still stored in optimal conditions and there is no limitation to image it a second time for the 6 we have already imaged and a first time for the ones we could not have imaged back in october 2018.

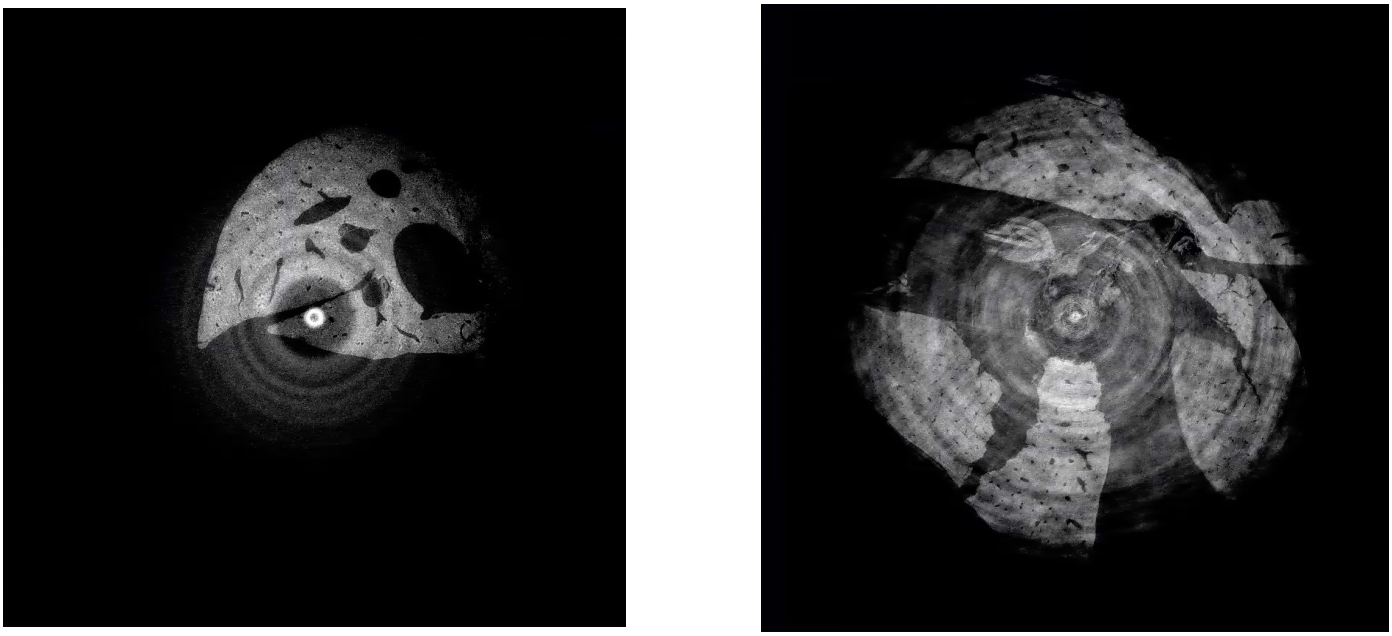

Illustration 1: Three different slices from 3D phase contrast tomography of three different samples