



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: Study of correlation effects in the unusual magnetic properties of Epsilon-FeSi	Experiment number: A25-2-1035
Beamline:	Date of experiment: from: 22/11/2022 to: 28/11/2022	Date of report:
Shifts:	Local contact(s): Juan Rubio-Zuazo	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Laboratory SpLine CRG c/o ESRF 71 avenue des Martyrs CS 40220 FR - 38043 GRENOBLE Cedex 09 Dr RUBIO ZUAZO Juan Dr LOPEZ SANCHEZ Jesus SEBASTIANI Eugenia		

Report:

The aim of this study was to understand the correlation effects in the unusual magnetic properties of ϵ -FeSi by means of temperature-dependent core- level and valence band Hard X-Ray photoelectric on spectroscopy. This system has a semiconductor-to-metal crossover at 300 K, as shown in the electric conductivity measurements and a magnetic susceptibility that rises nearly exponentially up to 500 K, where it reveals a broad maximum, followed by a Curie-Weiss law at even higher temperatures.

With the specially designed experimental set-up devoted to HAXPES and the sample manipulator equipped with a cryostat we were able to cool down the sample to 30K and afterwards with the heating stage able to heat the sample above 700K. We perform the temperature dependent High resolution Hard X-ray photoemission spectroscopy starting from 30K to 700K, measuring at 30K, 70K, 250K, 350K, 450K, 500K, 550K, 700K. We measured at the valence band as well at the Fe-2p, Fe- 3s and Fe-1s core level on ϵ -FeSi. We used a fixed photon energy of 12keV to ensure the access to bulk information.

Further data analysis of the results and correlation with the magnetic measurements must be done prior to being able to determine the degree of correlation between Si-sp Fe-3d interaction as well as the e-e repulsion in iron silicides. However, a first look at the result indicate that there is a correlation present.