

Report on the Transnational Access Activity carried out within MICROKELVIN

The eligibility of transnational access to a MICROKELVIN TA site implies the submission of the following:

1) **The Certification of visit**

The form "Certification of visit" must be completed and signed by the access provider in charge of the infrastructure and the leader of the project.

2) **A TA project report**

The form for the TA project report is contained within this document. It should be completed after project end by the group leader of the project. You must respect the limited number of words specified, longer descriptions will be rejected. Figures/tables may be attached at the end of the document. The document must be submitted in an editable format (doc, rtf).

3) **A User group questionnaire**

To enable the Commission to evaluate the Research Infrastructures Action, to monitor the individual contracts, and to improve the services provided to the scientific community, each project leader of a user-project supported under an EC Research Infrastructure contract is requested to complete a "user group questionnaire". The questionnaire must be submitted once by each user group to the Commission as soon as the experiments on the infrastructure come to end.

The user group questionnaire is not part of this document and must be completed on-line. It is accessible at:

http://cordis.europa.eu/fp7/capacities/questionnaire_en.html.

► **Please note that any publications resulting from work carried out under the MICROKELVIN T**

A activity must acknowledge the support of the European Community :

“The research leading to these results has received funding from the European Community’s Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 228464 (MICROKELVIN).”



MICROKELVIN Transnational Access Project Report

1. General information

Project number:	CNRS 15	
Project Title:	Structure factor of two-dimensional ^3He	
Lead scientist: ¹	Title:	Prof.
	First name:	Jordi
	Last name:	Boronat
	Home institution:	Universitat Politècnica de Catalunya
Host scientist: ²	Title:	Dr.
	First name:	Henri
	Last name:	Godfrin
	Home institution:	CNRS – Institut Néel
Project scientist: ³	Title:	Prof.
	First name:	Jordi
	Last name:	Boronat
	Birth date:	05/01/1961
	Passport number:	78576665V (National ID. card)
	Research status/Position:	Full professor
	New User: ⁴	Yes
	Scientific Field:	Quantum Fluids and Solids
	Home institution:	Universitat Politècnica de Catalunya
	Is your home institution MICROKELVIN partner?	<input checked="" type="checkbox"/> No
	Business address:	Departament de Física I Enginyeria Nuclear
	Street:	Jordi Girona,31
	PO Box:	
	City:	Barcelona
	Zip/Postal Code:	08034
	Country:	Spain
	Telephone:	+34 934017286
	Fax:	+34 934017100
	E-mail:	Jordi.boronat@upc.edu

¹ The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure.

² The host scientist is supervising the work of the visiting project scientist at the infrastructure.

3

The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure.

4

Indicate 'Yes' only if the user has never visited the infrastructure before this specific project, otherwise write 'No'.

2. Project information

<p><u>Please, give a brief description of project objectives:</u> (250 words max)</p>	<p>Our main goal is to get insight on the properties of ^3He adsorbed on a carbon surface by a combined effort of theory and experiment. Recent activity in the experimental group of Prof. Godfrin in the Institut Néel-CNRS of Grenoble has allowed for the first time to measure elusive and long pursued magnitudes in low temperature physics: the static and dynamic structure factors of ^3He in a nearly two-dimensional environment. The precision achieved makes possible to compare with accurate theoretical results derived from microscopic theory. Our goal with this project is to merge the new experimental data and many-body theory in order to better understand the properties of quasi-two-dimensional ^3He, which is the best example of a strongly interacting Fermi fluid.</p>
<p><u>Technical description of work performed:</u> (250 words max)</p>	<p>We have prepared the computation programs to carry out the quantum Monte Carlo calculation of the static structure factor of a 2D ^3He film. We have checked that the data is numerically consistent using some benchmarks. The program is now in the position of starting to generate statistics to sample properly the data. The program will provide us with results of the total static structure factor and the up-up and up-down spin components. With these functions we can obtain results for both the density and spin structure factors. The calculations will be carried out during the next weeks within the density range relevant for the Grenoble experiments. On the other hand, we have started to analyse the experimental neutron scattering data and devised the right strategy for an accurate extraction of the static structure factor to be compared with the theoretical estimates.</p>
<p><u>Project achievements (and difficulties encountered):</u>⁵ (250 words max)</p>	<p>The quantum Monte Carlo programs have been checked and their consistency verified. The first benchmarks have been carried out and the results prove to be consistent. Now what remains is to accumulate sufficient statistics to reduce the noise to a reasonable level.</p> <p>The strategy for a right integration of the experimental data on the dynamic structure factor measured recently in Grenoble has been devised and the first results are already obtained. Corrections at higher energy have been also discussed and are going to be implemented in the next weeks.</p>
<p><u>Expected publications and dates:</u></p>	<ul style="list-style-type: none">▪ Static structure factor of two-dimensional ^3He
<p><u>Submission date of user group questionnaire:</u></p>	<p>January 22, 2013</p>

Completed Project Reports should be returned to MICROKELVIN Management Office (Sari.Laitila@aalto.fi, Fax: +358 9 47022969).