



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 TA 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:	LANCS06	
Project Title:	Novel methods and devices for ultralow temperature measurements	
Lead scientist: ¹	Title:	Prof.
	First name:	Dominik
	Last name:	Zumbuhl
	Home institution:	University of Basel
Host scientist: ²	Title:	Prof.
	First name:	George
	Last name:	Pickett
	Home institution:	Lancaster University
Project scientist: ³	Title:	Ph.D. student
	First name:	Dario
	Last name:	Maradan
	Home institution:	University of Basel
Project scientists:	Title:	Ph.D. student
	First name:	Myrsini
	Last name:	Lafkioti
	Home institution:	University of Basel
Project scientists:	First name:	Lucas
	Last name:	Casparis
	Birth date:	08.11.1985
	Passport number:	F1269014
	Research status/Position:	PhD Student
	New User: ⁴	
	Scientific Field:	Condensed Matter/Nanoscience
	Home institution:	
	Is your home institution MICROKELVIN partner?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	Business address:	Departement Physik
	Street:	Klingelbergstrasse 82
	PO Box:	
	City:	Basel
	Zip/Postal Code:	4056
	Country:	Switzerland

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 project scientist is the person who will be visiting the infrastructure.

⁴ Indicate 'Yes' only if the user has never visited the infrastructure before this specific project, otherwise write 'No'.

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All 3 graduate students from prof. Zumbuhl's group in the University of Basel (Casparis, Lafkioti, and Maradan) were visiting at the same time the University of Lancaster for 4 days (in total 12 days).

2. Project information

<p><u>Please, give a brief description of project objectives:</u> (250 words max)</p>	<p>The most fundamental and important role of the MICROKELVIN consortium is the opening of the microkelvin regime to nanoscience experiments. The BASEL group is one of the very few outside the access-offering institutions who are actively pursuing the nuclear cooling of nanoscale samples. The BASEL group have their own systems and are also taking delivery of a cryostat built within the consortium by BLUEFORS. The purpose of the current project is the technology transfer from the ULANC group to BASEL of the methods of operating large nuclear cooling systems and in particular the development of nuclear magnetic resonance thermometers.</p> <p>The project will allow the BASEL group, with its existing nuclear refrigerator and also with the new consortium-provided system, to capitalize on the experience of the ULANC group's long experience in operating large-scale nuclear installations.</p>
<p><u>Technical description of work performed:</u> (250 words max)</p>	<p>The two principal outcomes of this project are first, the transfer of good practice concerned with running and managing the large refrigerators, especially with regard to thermometry and secondly, the construction of two state-of-the art platinum brush thermometers by the visitors under ULANC supervision for transfer and use in BASEL.</p> <p>The thermometers are to be constructed of 0.025 mm diameter bare 99.99% pure platinum wire. The wire will be wound on a former to form a bundle a cm or so long. The wires at one end will then be soldered together using molten silver as the solder medium. Neither platinum nor silver has a significant oxide layer when molten so this system has the advantage that no added flux is needed. The silver bead at the end of the thermometer will then be spot-welded to the silver support unit being brought from Basel. Once this weld is finished the wires are gently separated to avoid resistive contacts between them which can lead to eddy current heating when the bundle is being used as the working "fluid" for a pulsed NMR thermometer.</p> <p>Two such thermometers will be produced, using the Pt wire bundles manufactured in Lancaster and the NMR coil system, support and silver thermal contact pieces manufactured in Basel.</p>
<p><u>Project achievements (and difficulties encountered):</u>⁵ (250 words max)</p>	<p>The Platinum wire was successfully fabricated into two Platinum brushes and molten into the silver support structure, in order to allow a large as possible thermal conductance. The support structure and the platinum brushes were further welded together to allow placement in the BASEL Microkelvin system. During the whole visit we discussed at great length pulsed NMR thermometry, as well as microkelvin physics in general. In the meantime the last step of building a pick-up coil around the Pt brushes and assembly of the thermometer have been accomplished in Basel. The thermometer is now an essential part of the BASEL Microkelvin experiment.</p>

<u>Expected publications and dates:</u>	Publication is expected after the first access experiments have taken place, the device is still being tested
<u>Submission date of user group questionnaire:</u>	20.02.2012

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