



## Application Form for MICROKELVIN Transnational Access Project

### 1. General Information

<b>Project number:</b>	LANCS06		
<b>Project Title:</b>	Novel methods and devices for ultralow temperature measurements		
<b>Lead scientist:</b> <sup>1</sup>	<b>Title:</b>	graduate student	
	<b>First name:</b>	Dario	
	<b>Last name:</b>	Maradan	
	<b>Birth date:</b>	18.10.1986	
	<b>Passport number:</b>	C3816896	
	<b>Research status/Position:</b>	PhD Student	
	<b>New User:</b> <sup>2</sup>	Yes	
	<b>Scientific Field:</b>	Condensed matter/nanoscience	
	<b>Home institution:</b>	University Basel	
	<b>Is your home institution MICROKELVIN partner?</b>	Yes	
	<b>Business address:</b>	Department Physik	
	Street:	Klingelbergstrasse 82	
	PO Box:		
	City:	Basel	
	Zip/Postal Code:	4056	
	Country:	Switzerland	
	Telephone:	0041612673695	
	Fax:		
	E-mail:	d.maradan@unibas.ch	
	<b>Curriculum vitae (18 lines max):</b>	Currently graduate student with Professor Dominik Zumbühl's group (BASEL) developing nuclear cooling methods for nanoscale experiments.	
	<b>Status</b>	2011-            PhD Student in Prof. D. Zumbühl group at the University of Basel 2008-2010 MSc in Nanoscience with a major in Physics, University of Basel 2005-2008 BSc in Nanoscience, University of Basel	
	<b>Five most recent publications:</b>	1 - Method for Cooling Nanostructures to Microkelvin Temperatures, Rev Sci Instrum, Vol. 81, 2010 2 - Improved Kelvin probe force microscopy for imaging individual DNA molecules on insulating surfaces, Applied Physics Letters, 97, 2010	
<b>Other participating scientists:</b> <sup>3</sup>	<b>Name:</b>	<b>Position:</b>	<b>New User:</b> <sup>2</sup>
	1-Myrsini Lafkioti	Post-Doc	Yes
	2-Lucas Casparis	PhD Student	Yes

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

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

<sup>2</sup> Indicate 'Yes' only if the user has never visited the infrastructure before this specific project, otherwise write 'No'.

<sup>3</sup> Please list all participating user group members. Expand the table, if necessary.

## 2. Project Information

<b>Name of host infrastructure:</b>	Lancaster University, Lancaster UK (MICROKELVIN TA3-ULANC)		
<b>Access provider / Infrastructure Director:</b>	<b>Name:</b> George Pickett	<b>E-mail address:</b> g.pickett@lancaster.ac.uk	
<b>Planned project dates:</b>	<b>Start date:</b>	(4/7/2011)	<b>Completion date:</b> (8/7/2011)
<b><u>Project description (12 lines max):</u></b>			
<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>			
<b><u>Scientific objectives of the project (12 lines max):</u></b>			
<p>The objectives are straightforward. To transfer the best (or at least different) thermometric practice to the BASEL group with especial emphasis on platinum NMR thermometry. To understand the operation of these thermometers and how they are used. At the same time to give the BASEL group experience of the everyday running of the large ULANC facility, which hopefully will lead to more interchanges and increased use of the ULANC TA opportunities by the BASEL group.</p> <p>The ULANC group will also manufacture two state-of-the-art Pt thermometers which can then be used in BASEL. The equipment and knowledge so gained will enhance the capability of the BASEL group's facility and will specifically enhance their thermometric capability and improve the experimental outcomes of the group.</p>			
<b><u>Technical description of work to be performed (20 lines max):</u></b>			
<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>			

## 3. Joint Proposals / Funding

<b>Is this project in collaboration with other (concurrent) projects at the infrastructure?</b>	<b>No</b>
<b>If yes, please specify:</b>	
<b>Is this proposal submitted to any funding programmes?</b>	<b>No</b>

If yes, please specify:

The completed Application Form should be submitted to MICROKELVIN Management Office  
([laitila@neuro.hut.fi](mailto:laitila@neuro.hut.fi), fax +358-9-47022969)