welcome to the European Microkelvin Collaboration

CAPACITIES

Application Form for MICROKELVIN Transnational Access Project

1. General Information

Project number:	CNRS10	
Project Title:	**Adiabatic Demagnetization Stage**	
Lead scientist:[1]	**Title:**	Dr.
	First name:	Jozef
	Last name:	Kacmarcik
	Home institution:	Department of Very Low Temperature Physics, Institute of Experimental Physics, Slovak Academy of Sciences, Kosice, Slovakia
Host scientist:[2]	**Title:**	Professor
	First name:	Thierry
	Last name:	Klein
	Home institution:	J. Fourier University and CNRS-Neel Institute
Project scientist:[3]	**Title:**	Dr.
	First name:	Jozef
	Last name:	Kacmarcik
	Scientific Field:	superconductivity
	Home institution:	Department of Very Low Temperature Physics, Institute of Experimental Physics, Slovak Academy of Sciences, Kosice, Slovakia
	Is your home institution MICROKELVIN partner?	Yes
	Business address:	
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	PO Box:	
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	Telephone:	00421 55 792 2306
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	E-mail:	kacmarci@saske.sk
	Curriculum vitae (18 lines max): - 2002 - present: Centre of Very Low Temperature Physics, Institute of Experimental Physics, Slovak Academy of Sciences (SAS), Kosice, Slovakia, Current position: Scientific researcher, specialisation: superconductivity (spectroscopic, transport and thermodynamic measurements) - 2003 - 2004: Post-Doctoral stay at CEA Grenoble, DRFMC - Service de Physique Statistique Magnétisme et Supraconductivite, France, Position: Scientific researcher, specialisation: point-contact spectroscopy - 1996 - 1999: PhD study, Institute of Experimental Physics SAS, Kosice, PhD thesis: "Study on the upper critical magnetic field of selected superconductors" - 1991 - 1996: Faculty of Science, P.J. Safarik University, Kosice, Slovakia, Master degree in Mathematics and Physics, Diploma thesis: “Tunneling spectroscopy of high-T_c superconductors”	

[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.

	Five most recent publications:		
	1 - Z. Pribulova, J. Kacmarcik, C. Marcenat, P. Szabo, T. Klein, A. Demuer, P. Rodiere, D.J. Jang, H.S. Lee, H.G. Lee, S.I. Lee, P. Samuely: Superconducting energy gap in $MgCNi_3$ single crystals: Point-contact spectroscopy and specific-heat measurements, Phys. Rev. B 83 (2011) 104511.		
	2 - P. Husanikova, J. Kacmarcik, V. Cambel, G. Karapetrov: Superconducting and normal state parameters of single crystal $Cu_{0.1}0TiSe_2$, Solid State Communications 151 (2011) 227.		
	3 - J. Kacmarcik, Z. Pribulova, C. Marcenat, T. Klein, P. Rodière, L. Cario, and P. Samuely: Specific heat measurements of a superconducting NbS_2 single crystal in an external magnetic field: Energy gap structure, Phys. Rev. B 82 (2010) 014518.		
	4 - C. Marcenat, J. Kacmarcik, R. Piquerel, P. Achatz, C. Dubois, G. Prudhon, B. Gautier, J.-C. Dupuy, E. Bustarret, L. Ortega, T. Klein, J. Boulmer, T. Kociniewski, and D. Debarre: Low-temperature transition to a superconducting phase in boron-doped silicon films grown on (001)-oriented silicon wafers, Phys. Rev. B 81 (2010) 020501(R).		
	5 - J. Kacmarcik, C. Marcenat, T. Klein, Z. Pribulova, C. J. van der Beek, M. Konczykowski, S. L. Budko, M. Tillman, N. Ni, and P. C. Canfield: Strongly dissimilar vortex-liquid regimes in single-crystalline NdFeAs(O,F) and $(Ba,K)Fe_2As_2$: A comparative study, Phys. Rev. B 80 (2009) 014515.		
Other participating scientists:[4]	**Name:**	**Position:**	**New User:**

[4] Please list all participating user group members. Expand the table, if necessary.

2. Project Information

Name of host infrastructure:	**Institut Néel, CNRS, Grenoble, France**			
Access provider / Infrastructure Director:	**Name: Godfrin Henri**		**E-mail address: henri.godfrin@grenoble.cnrs.fr**	
Planned project dates:	**Start date:**	**[14/05/2012]**	**Completion date:**	**[14/06/2012]**

Project description (12 lines max):

During this project we will test and optimize small demagnetization stages with paramagnetic salt coupled with standard PPMS sample pucks to cool 2 samples from room temperature down to typically 30 mK in less than to 2 hours. These modified pucks can be used in a Quantum Design PPMS (Physical Property Measurement System) present both at Néel Institute and in the Department of Low Temperature Physics at Kosice. This will allow a constant and swift back-and-forth between sample preparation and measurements at low temperature and decreases considerably the turn-over time compared to classical dilution refrigerators generally used in this temperature range. An early design and construction of a prototype will be carried out at Neel Institute and at the Department of low temperature physics at Kosice.

Scientific objectives of the project (12 lines max):

The development of such small and versatile demagnetization stages will be a major point for the success of projects where the optimization of the conditions of preparation and synthesis of samples are crucial for their properties at low temperature. They will be used first in studies of heavily-doped silicon and diamond where the main scientific objective is to modulate the superconducting properties by applying an external electric field using ionic liquids which is expected to tune the carrier concentration at the surface (interface) of the doped epilayers. Changing the bias voltage in these electrical double layers is however achieved at high temperature 200-300K for diffusion of the molecules within the electrolyte. This makes relatively complex and time consuming the experimental protocol for the measurements at low temperature with ^{3}He probes and dilution units. The goal of this project is to circumvent this difficulty.

Technical description of work to be performed (20 lines max):

The technical support and knowledge at the host institute and access to the microkelvin platform is essential for the success of this project.

Preliminary steps performed both at Kosice and Grenoble :
- Design and construction of the demagnetization stage
- Growth of the paramagnetic salt

During the stay in Grenoble :
- Calibration of RuO thermometers down to 20mK
- Tests and optimizations of the experimental protocol to obtain the lowest temperature.

3. Joint Proposals / Funding

Is this project in collaboration with other (concurrent) projects at the infrastructure?	**No**
If yes, please specify:	

Is this proposal submitted to any funding programmes?	**No**
If yes, please specify:	

The completed Application Form should be submitted to MICROKELVIN Management Office (Sari.Laitila@aalto.fi, fax +358-9-47022969)