welcome to the European Microkelvin Collaboration

CAPACITIES

MICROKELVIN Transnational Access Project Report

1. General information

Project number:	**AALTO09**	
Project Title:	**Surface waves at the solid-liquid interface of 3He crystal and 3He superfluid**	
Project Accronym		
Lead scientist:[1]	**Title:**	**Dr**
	First name:	**Viktor**
	Last name:	**Tsepelin**
	Birth date:	**11 January 1974**
	Passport number:	**KB0032507**
	Research status/Position:	**Lecturer**
	New User:[2]	**No**
	Scientific Field:	**Quantum fluids and solids**
	Home institution:	**Lancaster University**
	Is your home institution MICROKELVIN partner?	Yes
	Business address:	**Department of Physics**
	Street:	**Lancaster University**
	PO Box:	
	City:	**Lancaster**
	Zip/Postal Code:	**LA1 4YB**
	Country:	**UK**
	Telephone:	**+44 1524 593 224**
	Fax:	
	E-mail:	**v.tsepelin@lancaster.ac.uk**

[1] The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure.
[2] Indicate 'Yes' only if the user has never visited the infrastructure before this specific project, otherwise write 'No'.

2. Project information

Please, give a brief description of project objectives: (250 words max)	In order to observe crystallization waves on the rough surface of the helium-3 crystal temperatures have to be on the order of 0.1Tc. The requirement of such low temperatures makes this project extremely technically demanding. In order to cool He3 liquid to 0.1-0.15Tc, nucleate and grow single He3 crystal a new approach to the experimental cell is required. In the future the direct optical observation of the surface is desired. However, to prove the concepts and to nucleate and to grow the crystal at low temperatures, at first capacitive detection techniques will be employed. After the successful completion of this stage the second generation cell with optical detection will be designed and built.
Technical description of work performed: (250 words max)	During visit design a nuclear stage/cell for detection of freezing-melting waves on the solid-superfluid interface of He3 have been reviewed and finalized. Number and detailed design of the vibrating oscillators have been decided. A design for cooling plates of melting curve thermometer has been conceptualised. The general design of the cell assembly including the heat-switch and connections to mixing chamber is completed as well. Tuning forks for the inner part of the cell have been tested in vacuum at low temperatures and considered adequate.
Project achievements (and difficulties encountered)**:**[5] (250 words max)	The cell design has been finalized with detailed placement of the components of the inner chamber. The manufacturing of the inner parts of the cell (heat-exchanges, thermometers) have started to take place. Vibrating structures have been selected for inner cell, tuning forks been successfully tested and are ready to be mounted. Progress of the project has been reviewed. Some of the heatlinks were found to be inadequate, as their RRR was too low. The purity of the material needs to be checked, improved and new links tested.
Expected publications and dates:	**Proceedings of QFS2010, Aug 2010** ▪ ▪
Submission date of user group questionnaire:	

Completed Project Reports should be returned to MICROKELVIN Management Office (Katariina.Toivonen@neuro.hut.fi, Fax: +358 9 4512969).