welcome to the
European Microkelvin Collaboration

CAPACITIES

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)."**

.

welcome to the European Microkelvin Collaboration

CAPACITIES

MICROKELVIN Transnational Access Project Report

1. General information

Project number:	AALTO23	
Project Title:	**Charge and heat transport in quantum dots coupled to superconducting leads**	
Lead scientist:[1]	**Title:**	Professor
	First name:	Hervé
	Last name:	Courtois
	Home institution:	Institut Néel, CNRS, Grenoble
Host scientist:	**Title:**	Professor
	First name:	Jukka
	Last name:	Pekola
	Home institution:	Low Temperature Laboratory, Aalto University
Project scientist:	**Title:**	M.Sc.
	First name:	David
	Last name:	van Zanten
	Birth date:	18-07-1985
	Passport number:	EU ID-Card: IX02725B0
	Research status/Position:	Postdoctoral researcher
	New User:[2]	Yes
	Scientific Field:	Nanoscience
	Home institution:	Institut Néel
	Is your home institution MICROKELVIN partner?	☒ Yes ☐ No
	Business address:	Institut Néel, CNRS, Grenoble
	Street:	25 avenue des Martyrs
	PO Box:	BP 166
	City:	Grenoble
	Zip/Postal Code:	38042
	Country:	France
	Telephone:	0033476887818
	Fax:	
	E-mail:	david.van-zanten@grenoble.cnrs.fr

[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)	The task is to analyse electron and heat transport through SINIS structures where the normal island is a weakly coupled quantum dot. This work will be compared to numerical calculations on SINIS structures where the normal island does not have a significant level spacing.
Technical description of work performed: (250 words max)	The main goal of this one week visit was to establish a close collaboration, to gain new understanding so that ultimately one could measure charge and heat transport through quantum dots coupled to superconducting leads. As a first step, a numerical model was realized to describe heat and current transport in the basic SINIS structure. This laid the foundations for including discrete energy levels in the dot (in the otherwise familiar picture of transport analysis based on a master equation approach) and for including in the rate equations the theoretical input on what is known about different relaxation mechanisms. This approach enables a comparison to experimental results obtained from metallic islands where the density of states is practically uniform. The experiment will ultimately measure directly the energy relaxation rates, which determine the degree of non-equilibrium in a dynamic situation. The discreteness of the energy levels may provide a way of faster operation of a single-electron turnstile, and suppression of its transfer errors.
Project achievements (and difficulties encountered)[5]: (250 words max)	A collaborative project was started with plans for future experiments and modelling. The first step with a numerical model to describe heat and current transport was completed.
Expected publications and dates:	▪
Submission date of user group questionnaire:	27-02-2012

Completed Project Reports should be returned to MICROKELVIN Management Office (laitila@neuro.hut.fi, Fax: +358 9 47022969).