



## 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](http://cordis.europa.eu/fp7/capacities/questionnaire_en.html).

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**► 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

<b>Project number:</b>	AALTO28	
<b>Project Title:</b>	Dynamics of quantized vortices in superfluids & superconductors	
<b>Lead scientist:</b> <sup>1</sup>	<b>Title:</b>	Professor
	<b>First name:</b>	Edouard
	<b>Last name:</b>	Sonin
	<b>Home institution:</b>	Racah Institute of Physics, Hebrew University
<b>Host scientist:</b> <sup>2</sup>	<b>Title:</b>	Professor
	<b>First name:</b>	Matti
	<b>Last name:</b>	Krusius
	<b>Home institution:</b>	O.V. Lounasmaa Laboratory, Aalto University
<b>Project scientist:</b> <sup>3</sup>	<b>Title:</b>	Professor
	<b>First name:</b>	Edouard
	<b>Last name:</b>	Sonin
	<b>Birth date:</b>	
	<b>Passport number:</b>	
	<b>Research status/Position:</b>	
	<b>New User:</b> <sup>4</sup>	
	<b>Scientific Field:</b>	
	<b>Home institution:</b>	
	<b>Is your home institution MICROKELVIN partner?</b>	No
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<sup>1</sup> The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure.

<sup>2</sup> The host scientist is supervising the work of the visiting project scientist at the infrastructure.

<sup>3</sup> The project scientist is the person who will be visiting the infrastructure.

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

## 2. Project information

<p><b><u>Please, give a brief description of project objectives:</u></b> (250 words max)</p>	<p>The main purpose of the visit is to discuss theoretical and experimental problems in vortex dynamics and turbulence in superfluids in the zero-temperature limit, as needed and appropriate for the theoretical research project of prof. Sonin, in particular with regard to his plans to publish a monograph on these topics. In addition, he participated in discussions and in the analysis of measurements on the propagation velocity of the turbulent vortex front in superfluid <math>^3\text{He-B}</math> which are currently conducted in the Lounasmaa Laboratory.</p>
<p><b><u>Technical description of work performed:</u></b> (250 words max)</p>	<p>During his 10-day visit prof. Sonin intensively discussed with N. Kopnin and G. Volovik two problems of zero-temperature vortex dynamics and turbulence: (i) Symmetry of Kelvin-waves and the Kelvin-wave cascade, and (ii) the role of superfluid backflow on the vortex mass.</p> <p>Prof. Sonin gave a seminar talk titled “Symmetry of Kelvin-wave dynamics and the Kelvin-wave cascade in the <math>T=0</math> limit in superfluid turbulence.” There were discussions with Matti Krusius and Vladimir Eltsov on the role of the angular momentum in the motion of the vortex front in their experiments. Ways to numerically detect power exponents in the Kelvin-wave cascade were discussed with Risto Hänninen. Sonin also received information on experimental research on suspended graphene in the Lounasmaa Laboratory.</p>
<p><b><u>Project achievements (and difficulties encountered):</u></b><sup>5</sup> (250 words max)</p>	<p>A number of issues concerning the views of Nikolai Kopnin and Gregory Volovik on the Kelvin-wave dynamics and on the problem of vortex mass at <math>T=0</math> were clarified. This was of great importance for the preparation of prof. Sonin’s monograph, where he expects to discuss these concepts in two separate chapters.</p> <p>Unfortunately, a final consensus on these widely debated issues is still lacking, and more discussion and work is needed.</p>
<p><b><u>Expected publications and dates:</u></b></p>	<p>A manuscript with the title “Transverse force on a vortex and vortex mass: effects of continuum and vortex-core quasiparticles” is in preparation by prof. Sonin. He expects to submit it to Phys. Rev. B for publication at the end of September – beginning of October 2012.</p>
<p><b><u>Submission date of user group questionnaire:</u></b></p>	<p>September 14, 2012</p>

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