



## Application Form for MICROKELVIN Transnational Access Project

### 1. General Information

<b>Project number:</b>	AALTO 43	
<b>Project Title:</b>	Self-localization of magnon Bose-Einstein condensates	
<b>Lead scientist:</b> <sup>1</sup>	<b>Title:</b>	Professor
	<b>First name:</b>	Yuriy
	<b>Last name:</b>	Bunkov
	<b>Home institution:</b>	Institute Neél, CNRS, Grenoble, France
<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>Visiting scientist:</b> <sup>3</sup>	<b>Title:</b>	Professor
	<b>First name:</b>	Yuriy
	<b>Last name:</b>	Bunkov
	<b>Birth date:</b>	29.08.1950
	<b>Passport number:</b>	08AA26721
	<b>Research status/Position:</b>	Directeur des Recherches at CNRS
	<b>New User:</b> <sup>4</sup>	No
	<b>Scientific Field:</b>	NMR, vortices, and superfluid dynamics
	<b>Home institution:</b>	Institute Neél, CNRS, Grenoble, France
	<b>Is your home institution MICROKELVIN partner?</b>	Yes
	<b>Business address:</b>	Avenue des Martyrs
	Street:	25 avenue des Martyrs, batiment M
	PO Box:	BP 166
	City:	Grenoble
	Zip/Postal Code:	38042 Grenoble cedex 9
	Country:	France
Telephone:	+33 (0)4 76 88 12 52, +33624480425	
Fax:	+33 (0)4 56 38 70 87	
<b>E-mail:</b>	Yuriy.Bunkov@grenoble.cnrs.fr <a href="http://neel.cnrs.fr/spip.php?article260&amp;personne=yuriy.bunkov/mcibt&amp;lang=en">http://neel.cnrs.fr/spip.php?article260&amp;personne=yuriy.bunkov/mcibt&amp;lang=en</a>	
<b>Curriculum vitae (18 lines max):</b>		
<p>Professor Bunkov is a senior member of the permanent staff at the Institute of Louis Neél of the Grenoble branch of CNRS, France. He is a widely known expert of 3He superfluids who received the International London Award in 2008 for his pioneering work on magnetic spin transport and coherent spin dynamics in superfluid 3He. He is also well known from his work on fast superfluid transitions in 3He, initiated by a single thermal neutron capture reaction event. His former visit to Aalto University concerned studies of magnon condensates in different rotating states. These</p>		

<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 indicated here is expected to supervise the campaign at the infrastructure.

<sup>3</sup> The visiting scientist indicated here is expected to participate in the campaign at the infrastructure.

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

	studies have since then been continued to explore the spin relaxation of these same rotating states.		
	<b>Five most recent publications:</b>		
	1- Yu. M. Bunkov, E. M. Alakshin, R. R. Gazizulin, A.V. Klochkov, V.V. Kuzmin, V.S. L'vov, and M.S. Tagirov. "High Tc spin superfluidity in antiferromagnets", Phys. Rev. Lett. 108, 177002 (2012).		
	2- P Hunger, Yu M Bunkov, E Collin, and H Godfrin, Superfluid transition in superfluid 3He in radially compressed aerogel, Journal of Physics: Conference Series. 400 012019 (2012).		
	3-- E.M. Alakshin, Yu.M. Bunkov, R.R. Gazizulin, A.V. Klochkov, V.V.Kuzmin, T.R. Safin and M.S. Tagirov, Atomic type magnon Bose-Einstein condensation in antiferromagnet.s, Journal of Physics: Conference Series 400 032001 (2012).		
	4- S. Autti, Yu. M. Bunkov, V. B. Eltsov, et al. "Self-trapping of magnon Bose-Einstein condensates on the ground and excited levels: from harmonic to a box confinement", Phys. Rev. Lett. <b>108</b> , 145303 (2012).		
	5-Yu. M. Bunkov, G. E. Volovik "Spin superfluidity and magnon BEC" Chapter IV of the book "Novel Superfluids", eds. K. H. Bennemann and J. B. Ketterson, Oxford University press, (2013) <a href="https://arxiv.org/abs/1003.4889v3">arXiv:1003.4889v3</a>		
<b>Other participating scientists:</b> <sup>5</sup>	<b>Name:</b>	<b>Position:</b>	<b>New User:</b> <sup>2</sup>

## 2. Project Information

<b>Name of host infrastructure:</b>	Low Temperature Laboratory, Aalto University		
<b>Access provider / Infrastructure Director:</b>	<b>Name:</b> prof. Matti Krusius	<b>E-mail address:</b> mkrusius@neuro.hut.fi	
<b>Planned project dates:</b>	<b>Start date:</b>	4.09.2013	<b>Completion date:</b> 8.09.2013
<b>Project description (12 lines max):</b>			
<p>During the past years the phenomenon of Spin Supercurrent has been redressed in the language of Bose-Einstein condensation, which has created new understanding on how to explore the resonances further. An important new dimension has been found to be rotation, by which one can control and modify the order parameter texture. It forms the trapping potential for the magnon condensate in its different states of the energy spectrum. Such measurements were performed in the first half of 2010 during the visits of Yuriy Bunkov and his graduate student Pierre Hunger. Subsequently a manuscript was prepared on the results from these measurements and their interpretation. Since then the BEC of magnons was discovered in a few new systems, including solid antiferromagnets. Of particular interest are excited BEC states which we have observed for the first time in these new systems.</p>			
<b>Scientific objectives of the project (12 lines max):</b>			
<p>In the meantime it has been found that the spin relaxation time of the magnon condensate in the ground state or on the different excited levels can be readily measured and displayed with available techniques. The first measurements on the relaxation times were performed in different rotating states, but this work should be continued further. It is clearly seen that a regular equilibrium vortex array provides large additional spin relaxation, similar to what has been observed to happen at solid surfaces in measurements at the Lancaster University. However, for instance vortices in a dynamic state of tangled motion or the free liquid surface have not yet been probed. Such measurements would provide important missing information which is needed to identify the source of the new relaxation mechanism.</p>			
<b>Technical description of work to be performed (20 lines max):</b>			
<p>The goal is to re-examine the relaxation studies of excited BEC states and to rework the current preliminary version of the book "Spin Superfluidity and magnon BEC", which describes the recent advances in this field,</p>			

<sup>5</sup> Please list all participating user group members. Expand the table, if necessary.

where the achievements of the Microkelvin project play a remarkable role.

### **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>
--	-----------

<b>If yes, please specify:</b>
--------------------------------

---

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