welcome to the European Microkelvin Collaboration

CAPACITIES

Application Form for MICROKELVIN Transnational Access Project

1. General Information

Project number:	AALTO 20	
Project Title:	**Self-localization of magnon Bose-Einstein condensates**	
Lead scientist:[1]	**Title:**	Professor
	First name:	Yuriy
	Last name:	Bunkov
	Home institution:	Institute Neél, CNRS, Grenoble, France
Visiting scientist:	**Title:**	Professor
	First name:	Yuriy
	Last name:	Bunkov
	Birth date:	29.08.1950
	Passport number:	08AA26721
	Research status/Position:	Directeur de Recherches at CNRS
	New User:[2]	No
	Scientific Field:	NMR, vortices, and superfluid dynamics
	Home institution:	Institute Neél, CNRS, Grenoble, France
	Is your home institution MICROKELVIN partner?	Yes
	Business address:	Avenue des Martyrs
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	Curriculum vitae (18 lines max): 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 rapid non-equilibrium superfluid transitions in 3He, initiated by a thermal neutron capture reaction. His former visit to Aalto University concerned a study of magnon condensates in different rotating states. These studies have since then been continued to explore the spin relaxation of these same rotating states.	
	Five most recent publications:	
	1 - Yu.M. Bunkov, E.M. Alakshin, R.R. Gazizulin, A.V. Klochkov, V.V. Kuzmin, T.R. Safin, M.S. Tagirov, *Discovery of the Classical Bose–Einstein*	

[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'.

	Condensation of Magnons in Solid Antiferromagnets, JETP Letters **94**, 68–72 (2011).		
	2 - P. Hunger, Yu. M. Bunkov, E. Collin, and H. Godfrin, *Evidence for Magnon BEC in Superfluid ^{3}He-A*, J. of Low Temp. Phys **158**, 129–134 (2010).		
	3 - Yuriy M. Bunkov, *^{3}He Experiments: Insights into Cosmology and Atomic Physics*, J. of Low Temp. Phys **158**, 118–128 (2010).		
	4 - Yuriy M. Bunkov and Grigoriy Volovik, *Magnon Bose Einstein Condensation and Spin Superfluidity*, J. Phys.: Condens. Matter 22 164210 (2010).		
	5 - Yu.M. Bunkov, *Spin superfluidity and magnons Bose–Einstein condensation*, Physics Uspekhi, 53, 843 (2010).		
Other participating scientists:[3]	**Name:**	**Position:**	**New User:**[2]
	1- Pierre Hunger	**Research associate**	no

2. Project Information

Name of host infrastructure:	Low Temperature Laboratory, Aalto University			
Access provider / Infrastructure Director:	**Name:** prof. Matti Krusius		**E-mail address:** mkrusius@neuro.hut.fi	
Planned project dates:	**Start date:**	29.12.2011	**Completion date:**	4.1.2012

Project description (12 lines max):

Long-lived coherent spin precession of 3He-B at the lowest temperatures around 0.2 Tc was discovered by Yuriy Bunkov while he was visiting the ultra-low temperature laboratory in the Lancaster University in the early nineties. Since then this coherent NMR mode has defied accurate description. During the past four years the phenomenon 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 [preprint: arXiv-1002.1674v1].

Scientific objectives of the project (12 lines max):

In the meantime it has been found that the spin relaxation times of the magnon condensate in the ground state or on the different excited levels can be readily measured and displayed with the available techniques. The first measurements on the relaxation times have been performed in the 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.

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

The goal is to discuss the relaxation studies and to rework the current version of the manuscript “Self-localization of magnon Bose-Einstein condensates in the ground state and on excited levels: from harmonic to a box-like trapping potential” which was submitted to a journal for publication recently [preprint: arXiv-1002.1674v3].

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

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)