

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 T**

A 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

Project number:	CNRS 13	
Project Title:	Magnetization and susceptibility measurements on spin liquids Ba ₃ CuSb ₂ O ₉ and (ET) ₂ Cu ₂ (CN) ₃	
Lead scientist:	Title:	Dr
	First name:	Sean
	Last name:	Giblin
	Birth date:	9 Apr 1979
	Passport number:	
	Research status/Position:	Lecturer
	New User:	Yes
	Scientific Field:	Condensed Matter
	Home institution:	University of Cardiff
	Is your home institution MICROKELVIN partner?	no
	Business address:	School of physics and Astronomy
	Street:	Queens Building
	PO Box:	The Parade
	City:	Cardiff
	Zip/Postal Code:	CF243AA
	Country:	UK
	Telephone:	7949378808
	Fax:	
	E-mail:	giblinr@cardiff.ac.uk

2. Project information

<p><u>Please, give a brief description of project objectives:</u> (250 words max)</p>	<p>The aim of the project was to investigate the bulk magnetic properties of quantum spin liquids under applied magnetic field. The interpretation of muon (a local implanted probe) experiments performed on Ba₃CuSb₂O₉ and (ET)₂Cu₂(CN)₃ suggests the existence of a quantum critical point and that the system is driven into a bulk non-collinear antiferromagnet on the application of a small magnetic field. However an alternative prediction suggests a staggered magnetisation of the quantum spin liquid state. It is possible that the muons are perturbing the sample and the interpretation of the muon data does not easily allow the separation of these two scenarios. However, the observation of an induced moment in the bulk of the sample would confirm the existence of a quantum critical point. Moreover if observed, ac susceptibility can be used to probe the dynamics around the transition. The understanding of triangular lattices which are the simplest prototype of the frustrated lattice spin liquid should offer a base for interpreting the behaviour of the more complex kagome and hyperkagome spin liquids.</p>
<p><u>Technical description of work performed:</u> (250 words max)</p>	<p>Sean Giblin came to Grenoble to perform the experiments, with the help of the CNRS staff (Carley Paulsen, Elsa Lhotel, and Martin Jackson) in Grenoble. Four samples were measured, with three being measured in the low field magnetometer and one in the high field magnetometer.</p> <p>Measurements were performed between 80 mK and 1 K, importantly relaxation measurements were performed on the magnetometers out to many hours, to our knowledge this aspect of the instrumentation combined with the low trapped field at the sample is unique. The staff at CNRS facilitated all requests for help including the rewriting of code to allow the change of cooling rates to investigate new physics. All samples were investigated using both ac susceptibility and dc magnetometry.</p>
<p><u>Project achievements (and difficulties encountered):</u>⁵ (250 words max)</p>	<p>We demonstrated in Ba₃CuSb₂O₉ that we saw no bulk magnetic order, using the same sample as previously used for other experiments.</p> <p>We did however use the remaining time to investigate other frustrated magnets including observing order in a frustrated single crystal for the first time and investigating the properties of cooling rates. Both of these results will have an impact on the field in general.</p>
<p><u>Expected publications and dates:</u></p>	<p>New characterisation of frustrated spin systems - 2013</p>
<p><u>Submission date of user group questionnaire:</u></p>	<p>30 Nov 2012</p>

Completed Project Reports should be returned to MICROKELVIN Management Office (Sari.Laitila@aalto.fi, Fax: +358 9 4512969).