

**Application Form for MICROKELVIN Transnational Access Project**

**1. General Information**

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| **Project number:** | **AALTO 17** | | | |
| **Project Title:** | **Microkelvin experimental platform** | | | |
| **Lead scientist:**[[1]](#footnote-1) | **Title:** | Dr | | |
|  | **First name:** | Jan | | |
|  | **Last name:** | Nyeki | | |
|  | **Birth date:** | 06/08/58 | | |
|  | **Passport number:** |  | | |
|  | **Research status/Position:** | Senior Research Officer | | |
|  | **New User:**[[2]](#footnote-2) | Yes | | |
|  | **Scientific Field:** | Quantum Fluids and Solids | | |
|  | **Home institution:** | Royal Holloway, University of London | | |
|  | **Is your home institution MICROKELVIN partner?** | Yes | | |
|  | **Business address:** | Department of Physics  Royal Holloway University of London (RHUL) | | |
|  | Street: | Egham Hill | | |
|  | PO Box: |  | | |
|  | City: | Egham | | |
|  | Zip/Postal Code: | TW20 0EX | | |
|  | Country: | United Kingdom | | |
|  | Telephone: | +441784443498 | | |
|  | Fax: | +441784472794 | | |
|  | E-mail: | jan.nyeki@rhul.ac.uk | | |
|  | Curriculum vitae (18 lines max):  06/2002 - present Senior Research Officer at RHUL, UK.  02/1994- 06/2002 EPSRC Research Fellow at RHUL,UK.  09/1984 - 02/1994 Senior Research Assistant at the Institute of Experimental Physics Slovak Academy of Sciences, Košice, Slovakia.  06/1993 PhD. degree in Low Temperature Physics and Cryogenics, P L Kapitza Institute, Moscow, Russia.  01/1988 - 01/1993 External postgraduate student at P L Kapitza Institute for Physical Problems, Moscow, Russia.  08/1982 - 09/1984 Research assistant at the Institute of Experimental Physics Slovak Academy of Sciences, Košice, Slovakia.  09/1977 - 06/1982 Masters Degree in Solid State Physics at P J Šafárik University in Košice, Slovakia. | | | |
|  | **Five most recent publications:** | | | |
|  | 1-Yager B., Nyeki J., Casey A., Cowan B.P., Lusher C.P., Saunders J., Drung D., Schurig T.: Pulsed Nuclear Magnetic Resonance on 3He adsorbed on bare and 4He preplated MCM-41 using DC SQUID detection. J. Low Temp. Phys., 158, (2010), 213-219 | | | |
|  | 2- Neumann M., Nyeki J., Cowan B., Saunders J.: Bilayer He-3: A simple two-dimensional heavy-fermion system with quantum criticality. Science, 317, (2007), 1356-1359 | | | |
|  | 3- Neumann M., Nyeki J., Cowan, B., Saunders J.: He-3 bilayer film adsorbed on graphite plated with a bilayer of He4 A new frustrated 2D magnetic system. AIP Conference Proceedings, 850, (2006), 317-318 | | | |
|  | 4- Neumann M., Nyeki J., Cowan B., Saunders J.: Solidification of the third helium layer on graphite. J. Low Temp. Phys, 138, (2005), 391-396 | | | |
|  | 5- Ziouzia F., Patel H., Nyeki J., Cowan B.P., Saunders J.: Possible phase transition at low mK temperatures in liquid helium mixture films adsorbed on graphite, J. Low Temp. Phys, 134, (2004), 79-84 | | | |
| **Other participating scientists:**[[3]](#footnote-3) | **Name:** | | **Position:** | **New User:2** |
|  | 1- John Saunders | | Professor | No |
|  | 2- Brian Cowan | | Professor | No |
|  | 3- Andrew Casey | | Lecturer | No |

**2. Project Information**

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| **Name of host infrastructure:** | **Low Temperature Laboratory, Aalto University** | | | |
| **Access provider / Infrastructure Director:** | **Name: Juha Tuoriniemi/**  **Mikko Paalanen** | | **E-mail address:** [**juha.tuoriniemi@aalto.fi**](mailto:jtt@neuro.hut.fi) | |
|  |  | |  | |
| **Planned project dates:** | **Start date:** | **30/05/2011** | **Completion date:** | **10/06/2011** |
| **Project description (12 lines max):**  Adiabatic demagnetization of copper is currently the preferred method for cooling condensed matter ex­periments down to the microkelvin temperature range. There are, however, no commercially built refrigera­tors available for that temperature range; only few laboratories in the world are able to build their own mi­crokelvin refrigerators.  At Royal Holloway, using our cryogenic engineering expertise, we have designed and manufactured a new microkelvin experimental platform based on a copper demagnetization stage. In order to achieve an optimal performance of the system a special heat treatment of copper parts is crucial.  The Helsinki Low Temperature Laboratory has pioneered manufacturing and experimental use of similar systems. They have also available all infrastructure and know-how necessary for the heat treatment of large copper parts.  We are planning to use those facilities to heat treat the crucial parts of our new microkelvin system. | | | | |
| **Scientific objectives of the project (12 lines max):**  Creating a facility to widen access of scientific community to microkelvin experimental range.  Our aim is to provide access to external academic (UK, EU and international) and industrial users to the mi­crokelvin (sub-dilution refrigerator base temperature) in magnetic fields up to 9T. This will contribute to the opening up of this temperature regime to new research users from a widened community, including nano­physics, semiconductor physics, strongly correlated materials. | | | | |
| **Technical description of work to be performed (20 lines max):**  All parts of the new microkelvin experimental platform will be manufactured at Royal Holloway. Fur­ther an­nealing and thermal treatment of selected parts will be carried out at Aalto University using existing infra­structure and local expertise from similar tasks carried out previously there.  Before annealing, the existing support structure in the vacuum furnace need to be adapted to ac­commodate the parts.  There will be two separate annealing processes required:  a) the copper demagnetisation stage will be annealed at 1200 K in vacuum followed up immedi­ately by annealing in controlled oxygen atmosphere in order to reach Residual Resistivity Ratio RRR ~ 500.  b) the microkelvin experimental plate and the thermal link will be annealed in vacuum at 1200 K fol­lowed up immediately by annealing in oxygen atmosphere in order to reach RRR > 1000  Each annealing sequence,including controlled cooling period, is expected to last 2-3 days. | | | | |

**3. Joint Proposals / Funding**

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| **Is this project in collaboration with other (concurrent) projects at the infrastructure?  No** |
| **If yes, please specify:** |

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| **Is this proposal submitted to any funding programmes? No** |
| **If yes, please specify:** |

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

1. The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure. [↑](#footnote-ref-1)
2. Indicate ’Yes’ only if the user has never visited the infrastructure before this specific project, otherwise write ’No’. [↑](#footnote-ref-2)
3. Please list all participating user group members. Expand the table, if necessary. [↑](#footnote-ref-3)