

**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 PhysicsRoyal Holloway University of London (RHUL) |
|  | Street: | Egham Hill |
|  | PO Box: |  |
|  | City: | Egham |
|  | Zip/Postal Code: | TW20 0EX |
|  | Country: | United Kingdom |
|  | Telephone: | +441784443498 |
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|  | 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** |
|  |  |  |
| **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 > 1000Each 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, 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)