



Application Form for MICROKELVIN Transnational Access Project

1. General Information

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| Project number: | AALTO32 | |
| Project Title: | Spin accumulation caused by triplet supercurrent | |
| Lead scientist: ¹ | Title: | Dr |
| | First name: | F. Sebastian |
| | Last name: | Bergeret |
| | Home institution: | Centro de Física de Materiales, San Sebastian |
| Host scientist: ² | Title: | Dr. |
| | First name: | Tero |
| | Last name: | Heikkilä |
| | Home institution: | Aalto University, O.V. Lounasmaa Laboratory |
| Project scientist: ³ | Title: | Mr |
| | First name: | Asier |
| | Last name: | Ozaeta |
| | Scientific Field: | Theoretical condensed matter physics |
| | Home institution: | Centro de Física de Materiales, San Sebastian |
| | Is your home institution MICROKELVIN partner? | No |
| | Business address: | |
| | Street: | Paseo. Manuel de Lardizabal 5 |
| | PO Box: | |
| | City: | San Sebastián |
| | Zip/Postal Code: | E-20018 |
| | Country: | Spain |
| | Telephone: | 0034 943018835 |
| | Fax: | |
| | E-mail: | asier_ozaeta@ehu.es |
| | Curriculum vitae (18 lines max): | |
| | <p>Participation in conferences: A. Ozaeta, A.S. Vasenko, F.W.J. Hekking and F.S. Bergeret, Andreev current enhancement and subgap conductance of superconducting hybrid structures in the presence of a small spin-splitting field, Short talk delivered at Superconducting Nanohybrids 2012 (Snh2012), San Sebastian, Spain. F.S. Bergeret, P. Virtanen, A. Ozaeta, T.T. Heikkilä and J.C. Cuevas. Enhancement of supercurrent in microwave irradiated superconducting quantum point contacts, Poster presentation delivered at Quantum Dynamics in Nanoscale Heterostructures workshop, Physikzentrum Bad Honnef, Germany (2010). A. Ozaeta and F.S. Bergeret, Introduction to transport in superconducting quantum point contact under the influence of a microwave field, Poster presentation delivered at the Frontiers of Condensed Matter workshop, Les Houches, France (2010).</p> <p>Conference organization: Superconducting Nanohybrids 2012 (Snh2012), San Sebastian, Spain. Scientific committee: F.S. Bergeret, A. Golubov and A. Zaikin. Organising committee: A. Ozaeta and A. Verso.</p> <p>Participation in projects: 2011-today. Participation in the Project "Transport Properties of Hybrid Nanostructures: Superconductors, Ferromagnets and Normal Metals", awarded by the Spanish Ministry of Science and Innovation and in the Project</p> | |

¹ The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure.

² The host scientist is supervising the work of the visiting project scientist at the infrastructure.

³ The project scientist is the person who will be visiting the infrastructure.

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| | "IT-366- 07", awarded by the Basque Government. | | |
| | Five most recent publications: | | |
| | 1 - A.S. Vasenko, A. Ozaeta , S. Kawabata, F.W.J. Hekking and F.S. Bergeret (2012). Andreev current and subgap conductance of spin-valve SFF structures. To be published in J. Supercond. Nov. Magn | | |
| | 2 - A. Ozaeta , A.S. Vasenko, F.W.J. Hekking and F.S. Bergeret (2012). Electron cooling in diffusive normal metal - superconductor tunnel junctions with a spin-valve ferromagnetic interlayer. Phys. Rev. B 85, 174518. | | |
| | 3 - A. Ozaeta , A.S. Vasenko, F.W.J. Hekking and F.S. Bergeret (2012). Andreev current enhancement and subgap conductance of superconducting hybrid structures in the presence of a small spin-splitting field. Phys. Rev. B 86, 060509(R). | | |
| | 4 - F.S. Bergeret, P. Virtanen, A. Ozaeta , T.T. Heikkilä and J.C. Cuevas (2011). Supercurrent and Andreev bound state dynamics in superconducting quantum point contacts under microwave irradiation. Phys. Rev. B 84, 054504. | | |
| Other participating scientists: ⁴ | Name: | Position: | New User: |
| | 1 - Pauli Virtanen | Post-doctoral fellow at OVLL | |

2. Project Information

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| Name of host infrastructure: | O.V. Lounasmaa/Low Temperature Laboratory, Aalto University | | |
| Access provider / Infrastructure Director: | Name: Pertti Hakonen | E-mail address: Pertti.Hakonen@aalto.fi | |
| Planned project dates: | Start date: | 01/03/2013 | Completion date: 31/05/2013 |
| Project description (12 lines max): | | | |
| <p>We plan to investigate the nonequilibrium properties of superconductor-ferromagnet-superconductor junctions with non-collinear magnetizations carrying triplet supercurrent. In a spin-polarized magnet this triplet supercurrent also carries spin current, which will therefore induce spin accumulation inside the superconductor. From the combination of spin current and supercurrent we expect spin-thermoelectric effects that we will explore as well. These effects would be most pronounced at very low temperatures. We expect the Microkelvin low temperature groups, such as those in Pisa (Dr. Francesco Giazotto) and Delft (Prof. Teun Klapwijk) to be capable of measuring these. Since our project also aims to study triplet correlations, our results might also be interest to other European groups working on transport properties of superconductor-ferromagnet junctions, such as the groups of Prof. Mark Blamire (Cambridge University), Prof. Jan Aarts (Leiden University), and Prof. Marco Aprili (Paris Sud University).</p> | | | |
| Scientific objectives of the project (12 lines max): | | | |
| <p>We aim to calculate the magnitude of the induced spin accumulation in the structure, relating it to the properties of the system – in particular of the interfaces but also the spin relaxation length in the superconductor - and the driven supercurrent through it. This theory is relevant for the understanding of the low-temperature properties of superconductor/ferromagnet hybrid structures. In the long run, our aim is to extend the calculated non-equilibrium properties to the general thermoelectric response of the junction.</p> | | | |
| Technical description of work to be performed (20 lines max): | | | |
| <p>Our approach is based on using the quasiclassical theory along with a recently formulated boundary condition applicable for such superconductor-ferromagnet junctions (F.S. Bergeret, A. Verso and A.F. Volkov, Phys. Rev. B 86, 214516 (2012)).</p> | | | |

3. Joint Proposals / Funding

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| Is this project in collaboration with other (concurrent) projects at the infrastructure? | Yes |
| If yes, please specify: | ERC project Heatronics (project number 240362) |

⁴ Please list all participating user group members. Expand the table, if necessary.

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| 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)