

Review and users' meeting of the MICROKELVIN collaboration

European Microkelvin Collaboration — MICROKELVIN — is an EU-funded Integrating Activity project carried out within the framework of the FP7 Capacities Specific Programme "Research Infrastructures". It is a bottom-up approach of 12 partners, to provide access to and develop applications in the ultra-low temperature regime. Its 18-month combined review and users' meeting was conducted in the Low Temperature Laboratory Oct 15-16, 2010. 25 collaboration members from outside LTL were present. The review hearings were overseen by the EU appointed programme officer Maria Douka and the official expert referee prof. Konstantin Arutyunov.

Microkelvin Collaboration was born from the recognition that research at the frontier near absolute zero has long been a powerhouse of new ideas in physics and beyond. Its principal objective is to open the milli- and microkelvin temperature regime to nanoscience, condensed matter physics, particle physics, cosmology, and instrumentation. The core of the collaboration is formed by three leading European ultra-low temperature laboratories at Aalto University (Helsinki), CNRS (Grenoble), and Lancaster University, which provide research opportunities and education at their microkelvin facilities to external users. Associated with the three core institutions are eight European laboratories and one cryogenic business, which together create "a unified European low temperature laboratory without walls".

The work of the MICROKELVIN Collaboration is divided in Networking Activities, Transnational Access Activities (responsible for access to the three core Laboratories), and most importantly in Joint Research Activities, within which the collaboration members jointly conduct research and prepare for applications according to a fixed work plan. Joint Research Activity 1 (JRA1) is developing ex-chip techniques by which the microkelvin temperature regime is most conveniently reached in nanoscience research. JRA2 is studying nanorefrigeration and nanothermometry with on-chip thin-film techniques, JRA3 is attacking fundamental physics questions with microkelvin condensed matter experiments, and finally JRA4 develops novel methods and devices for ultra-low temperature measurement. All activity within these different work packages is organized in terms of milestones and deliverable results which have to be reached according to a fixed time table. The task of the review meeting was to establish whether the promised results have been achieved and the time tables have been kept. The progress summaries on the different tasks within the work packages have also been described in the 18-month periodic Microkelvin report which had to be submitted within one month of the review meeting (available at http://www.microkelvin.eu/documents/Periodic_Report_18months.pdf)

The sessions of the users' meeting, in turn, provided the visitors and researchers, who have been making use of the Microkelvin facilities, the possibility to discuss their results and experiences. The morning sessions of the second meeting day were devoted to new research which has emerged since the drafting of the Microkelvin programme plan. The topic was topological insulators, in particular superfluid $^3\text{He-B}$ and its Majorana-like states on surfaces and in vortex cores. A number of detailed plans were outlined for measurements and the identification of Majorana states. The goal with these sessions was to prepare plans for a new concerted research effort which could be taken up within Microkelvin. The entire meeting programme is available at http://ltl.tkk.fi/wiki/Events/Microkelvin_2010.

The Microkelvin Collaboration is a lively community which vigorously advances European low temperature research and its applications, organizing several meetings, workshops, and tightly run working collaborations annually. An epochal achievement for the next report period is to complete the first fully automated cryogen-free cryocooler-operated nuclear refrigeration cryostat. It will then be developed to a standard commercially available laboratory instrument. The next users' meeting of the entire collaboration is organized in March 2011, in Smolenice castle in Slovakia.

Matti Krusius
chairman of review and users' meeting



Members of Microkelvin review and users' meeting, Oct 15, 2010.