

# **SEMINAR ON MAGNETISM AND SUPERCONDUCTIVITY**

We kindly inform You that on **Wednesday**

**January 31<sup>st</sup> at 10:00**

there will be a **seminar in room 203, building I**

where

**dr hab. Maciej Zgirski**

*(Institute of Physics PAS, Warsaw)*

will deliver a lecture on:

## **“Quantum thermodynamics with a single superconducting vortex”**

We introduce the Single Vortex Box (SVB) - a nanodevice that allows to treat a single superconducting vortex as a macroscopic, albeit quantized "particle", which can be created and annihilated with pulses of electrical current. Our pioneering demonstration is a pivotal step towards the development of the vortex electronics i.e. memory cells, superconducting diodes, and logical elements. Using the method of fast time-resolving switching thermometry [1], we measure the temperature rise and the subsequent thermal relaxation of the SVB resulting from the expulsion of just a single magnetic field vortex. Our experiment thus provides a calorimetric estimation of the dissipation in a superconductor due to a single moving vortex. This is a feat of the fundamental importance that has never been accomplished before, which belongs to the emerging field of the experimental quantum thermodynamics.

*1. M. Zgirski, M. Foltyn, A. Savin, A. Naumov, K. Norowski, Heat Hunting in a Freezer: Direct Measurement of Quasiparticle Diffusion in Superconducting Nanowire, Phys. Rev. Applied 14, 044024(2020)*

**The seminar will be given in English on-site in room 203, though the ZOOM transmission will be available - link is provided on the IP PAS website.**

**We sincerely invite You**

**Roman Puźniak  
Andrzej Szewczyk  
Henryk Szymczak**