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Thermo-magnetic stability of NbN films with controlled nano-granularity VITALIY YURCHENKO, University of Oslo, KONSTANTIN ILIN, Karlsruhe Institute of Technology, PAVLO MIKHEENKO, University of Oslo, M. SIEGEL, Karlsruhe Institute of Technology, YURI GALPERIN, TOM HENNING JOHANSEN, University of Oslo, UNIVERSITY OF OSLO TEAM, KARLSRUHE INSTITUTE OF TECHNOLOGY TEAM — The critical state in superconductors (SC) is metastable and can be destructed either by flux creep or by abrupt massive flux avalanches. The avalanches are associated with thermo-magnetic instability (TMI) of superconductors, which appears when the heat generated by the moving vortices is greater than the heat released into an environment. In that sense NbN films are known to be unstable, i.e. even the smallest increase of the external field may trigger a massive flux avalanche. Most theories developed to formulate the criteria of TMI operate in terms of intrinsic parameters of SC, such as heat capacity, critical current etc., and disregard the origins and the nature of the triggering mechanisms of the avalanches. We will present the most recent results of magneto-optical visualizations of flux dynamics in a series of NbN films with nano-scale disorder (ND) introduced in a well controlled fashion. We will demonstrate that not only do ND stipulate increase of the critical current but also promote correlated motion of large vortex bundles - micro jumps, which in turn trigger the macro avalanches.

Vitaliy Yurchenko
University of Oslo

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