Abstract Submitted
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Quantitative measurements of the magnetic field profile in superconductors[1] VLADIMIR KOZHEVNIKOV, Tulsa Community College, ANDREAS SUTER, Paul Scherrer Institute, Switzerland, HELMUT FRITZSCHE, NRC-CNRC Chalk River Laboratories, Canada, KRISTIAAN TEMST, Katholieke Universiteit Leuven, Belgium, THOMAS PROKSCHA, ELVEZIO MORENZONI, Paul Scherrer Institute, Switzerland, MARGRIET VAN BAEL, CHRIS VAN HAESENDONCK, JOSEPH INDEKEU, Katholieke Universiteit Leuven, Belgium — Measurement of the magnetic field profile $B(z)$, z being the distance from the sample surface, in the Meissner state of superconductors is one of the longest standing problems of experimental superconductivity. Importance of $B(z)$ follows, in particular, from the fact, that it provides a direct way to determine the key intrinsic parameters, such as the London penetration depth at zero temperature $\lambda_L(0)$ and the Pippard coherence length ξ_0. None of these parameters is known with justified uncertainty for *any* superconductor. $B(z)$ can be measured using Low-Energy Muon Spin Rotation spectroscopy (LE-μSR) and Polarized Neutron Reflectometry (PNR). To verify abilities of these techniques for quantitative measurements of $B(z)$ in unconventional superconductors and to examine the nonlocal electrodynamics effect predicted by Pippard in 1953, we performed an extensive series of cross LE-μSR and PNR measurements of $B(z)$ with two extreme type-I superconductors, In and Sn. Results obtained at the initial stage of this project were reported last year. Now the project is completed. Results unambiguously validate the nonlocal effect. Conditions which have to be met to use LE-μSR and/or PNR for measurements of $\lambda_L(0)$ and ξ_0 will be discussed.

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