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Probing superconductivity with polarized neutrons and low-energy muons[1] VLADIMIR KOZHEVNIKOV, Tulsa Community Colege, KRISTIAAN TEMST, MARGRIET VAN BAEL, CHRIS VAN HAESENDONCK, JOSEPH INDEKEU, Katholieke Universiteit Leuven, Belgium — A limited depth of magnetic field penetration is one of the most important properties of superconductors. It is usually assumed that in the Meissner state the field $B(z)$ decays exponentially with depth z. However, this cannot be the case, unless one deals with conventional type-II superconductors. For example, $B(z)$ is not exponential in nonlocal superconductors, but nonmonotonic and it even changes sign at a certain depth. Recently this nonlocal effect has been confirmed experimentally for a low-κ superconductor. Nonlocality was also predicted for d-wave superconductors, where it can arise from the diverging coherence length near nodal points in momentum space. For such materials and especially for novel superconductors measurements of $B(z)$ may be crucial for interpretation. The $B(z)$ can be measured using Polarized Neutron Reflectivity (PNR) and Low-Energy muon Spin Rotation (LE-μSR) techniques. In this talk we will present a critical review of the capabilities of the PNR and LE-μSR techniques based on our studies of nonlocality in In.

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