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Inverse proximity effect in a ferromagnet-superconductor thin film heterostructure investigated by GISANS with polarization analysis

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Three direct proximity effects in ferromagnet-superconducting thin film heterostructures of Nb and FePd with a lateral domain pattern have been found by temperature dependent electrical resistivity measurements, showing the influence of the magnetic domain structure on the superconducting state: reversed domain superconductivity, domain wall superconductivity and generation of spin-triplet Cooper pairs [1].

In this system, the inverse proximity effect, i.e. the effect of the entrance in the superconducting state on the magnetic structure has been studied by temperature dependent grazing incidence small angle neutron scattering (GISANS) on the KWS-3 diffractometer at the Heinz Maier-Leibnitz Zentrum [2] and by GISANS with polarization analysis on vSANS at the NIST Center for Neutron Research [3,4].

Guided by micromagnetic simulations [5], we present in this contribution simulations of the GISANS data within the distorted wave Born approximation [6,7]. We find that the domain walls width in FePd with strong perpendicular magnetic anisotropy increases when Nb enters the superconducting state [8].

[1] A. Stelhorn et al., New Journal of Physics, 22, 093001 (2020).

[2] Heinz Maier-Leibnitz Zentrum, Journal of Large-Scale Research Facilities 1, A31 (2015)

[3] J. Barker et al., Journal of Applied Crystallography, 55, 271 (2022)

[4] W.C. Chen et al., Journal of Physics: Conference Series, 2481, 012006 (2023)

[5] B. Vermeulen, Master Thesis, University of Liège and Forschungszentrum Jülich (2021) <http://hdl.handle.net/2268.2/11448>

[6] B.P. Toperverg, The Physics of Metals and Metallography, 116, 1337 (2015)

[7] E. Kentzinger et al., Physical Review B, 77, 104435 (2008)

[8] A. Stelhorn, PhD Thesis, RWTH Aachen University (2021)

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