the quasiparticle scattering and coherence effects in a superconductor.

TT 15.28 Tue 14:00 Poster B

Investigation of proximity systems with very low temperature STS — •Wolz Michael, Debuschewitz Christian, Kunej Vojko, and Scheer Elke — Fachbereich Physik, Universität Konstanz, 78457 Konstanz

We have investigated the superconducting proximity effect of double layer superconductor (S)- normal metal (N) systems with a very low temperature STM with high energy resolution. We used the BCS-superconductor Al. We have measured the density of states (DOS) for different thicknesses of the N-layer and for different N-materials (Au, Ag and Pd). The DOS of the Pd samples show a strong suppression of the superconuctivity in comparison to the Au and Ag samples. A possible explanation for that could be the strong electron-spin fluctuation coupling in Pd [2]. Our experimental data were fitted with a theoretical model of Belzig et al. [1] to check the dependence of the DOS on the interface quality and on the coherence lengths in N and S.

[1] W. Belzig, C. Bruder and G. Schön, Phys. Rev. B 54, 9443 (1996)

[2] T. Konzos et al., Phys. Rev. Lett. 93, 137001 (2004)

TT 15.29 Tue 14:00 Poster B

Geometrical Confinement in Superconducting/Ferromagnetic Heterostructures — •Silvia Haindl[1], Tanya Shapoval[1], Thomas Thersleff[1], Jens Ingolf Mönch[2], Ludwig Schultz[1], and Bernhard Holzapfel[1] — [1]Institute for Metallic Materials, IFW Dresden, PF 270116, 01171 Dresden, Germany — [2]Institute for Integrative Nanosciences, IFW Dresden, PF 270116, 01171 Dresden, Germany

In superconducting thin films, geometrical confinement and thus microstructuring has a strong influence on the nucleation of superconductivity. Additionally, in superconducting/ferromagnetic thin films an influence on the superconducting properties is exerted by the magnetic stray field of the ferromagnet. Superconducting/ferromagnetic heterostructures were prepared by UHV pulsed laser deposition (PLD). Ferromagnetic dots with and without microstructuring were covered by a superconducting thin Nb film. In order to demonstrate the direct influence of the geometrical confinement, a recently developed polishing technique was employed to reduce the thickness of the superconducting layer.

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Ferromagnet/superconductor heterostructures with different magnetic anisotropies — Niraj Joshi[1,2], Ajay Singh[3], •Christoph Sürgers[1,2], and Hilbert v. Löhneysen[1,2,4] — [1]Physikalisches Institut, Universität Karlsruhe, D-76128 Karlsruhe, Germany — [2]Center for Functional Nanostructures, Universität Karlsruhe, D-76128 Karlsruhe, Germany — [3]Bhabha Atomic Research Centre, Mumbai 400 085, India — [4]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, D-76021 Karlsruhe

In order to explore the interplay between magnetism and superconductivity in ferromagnet (F) / superconductor (S) heterostructures we have investigated various systems with different magnetic anisotropies by measurements of the transition temperature T_c, upper critical field B_{c2}, critical current I_c, and anomalous Hall effect. In the case where F is a Co/Pt multilayer with strong magnetic out-of-plane anisotropy, the superconducting properties of FSF triple layers depend on the relative orientation of the two F layer magnetizations. In a second approach we have modified the magnetic properties of ferrimagnetic $Fe_{1-x}Gd_x$ films in FS bilayers and FSF triple layers by small variations of the concentration x around $x = 0.25$ where the individual magnetizations of the Fe and Gd sublattices are nearly compensated. Finally, we present first magnetization measurements of epitaxially grown Co/Cu multilayers on Nb(110) single crystals in the superconducting and normal state.

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Andreev reflection measurements using amorphous WC superconducting contact — •Jose Barzola-Quiquia, Michael Ziese, and Pablo Esquinazi — Division of Superconductivity and Magnetism, University of Leipzig, Leipzig, Germany

In this contribution we present point-contact Andreev reflection measurements of Co/ and Cu/tungsten-carbide (WC) contacts. The patterning of the metallic thin films samples was done using e-beam lithography. The tungsten carbide (WC) superconductor tip was grown directly on the investigated sample by decomposition of a metallo-organic vapor (tungsten hexacarbonil) under a focused Ga ion beam (FIB). Measurements were performed in standard four-point configuration with and without applied magnetic field. The experimental conductance-voltage curves were analyzed with the Blonder-Tinkham-Klapwijk theory [Phys. Rev. B 25, 4515 (1982)]. The results highlight the possibilities and advantages of using amorphous WC tips for point-contact spectroscopy of mesoscopic metallic samples.

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Tunneling transport properties in $(La,Sr)_2CuO_4$ grain boundary Josephson junctions — •Andreas Stöhr[1], Michael Wagenknecht[1], Dieter Koelle[1], Reinhold Kleiner[1], Gennady Logvenov[2], and Ivan Bozovic[2] — [1]Physikalisches Institut - Experimentalphysik II and Center for Collective Quantum Phenomena, Universität Tübingen, Auf der Morgenstelle 14, D-72076 Tübingen, Germany — [2]Brookhaven National Laboratory, Upton, NY, U.S.A.

We investigate tunneling transport properties in thin film grain boundary Josephson junctions (GBJ's) of epitaxially grown $(La,Sr)_2CuO_4$ (LSCO) on bicrystal substrates. These optimally doped LSCO films were made by molecular beam epitaxy producing a very smooth film at the grain boundary. Measurements of the critical current I_c at low magnetic fields B (mT range) are used to characterize the quality of the junctions. Deviations from the ideal $I_c(B)$ pattern enable us to indicate the homogeneity of the GBJ. Measurements of the differential conductance in high magnetic fields (T range) are used to investigate quasiparticle tunneling across the grain boundary. Results are compared to theoretical predictions.

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Development of Josephson junctions with ferromagnetic barrier — •Dirk Sprungmann, Kurt Westerholt, and Hartmut Zabel — Ruhr-Universität Bochum Experimentalphysik IV, 44780 Bochum, Germany

π-coupled Josephson junctions with ferromagnetic interlayers enjoy an increasing interest in the spin electronic community since they are considered as candidates to be used for quantum bits. In order to investigate π-coupled Josephson junctions it is initially necessary to find a sample design which allows to produce reproducibly high quality Josephson junctions with a low or negligible sub-gap leakage. On our poster we present a sample design with a minimized number of process steps, which allows us to produce a complete sample within six hours. We describe the optimization of the different process steps in the preparation of the SIFS-type junctions, where I and F denote an Al_2O_3 and a ferromagnetic layer respectively.

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Fraunhofer pattern of a S-F-S Josephson junction as a function of the magnetization orientation — •Franz Czeschka[1], Sebastian T.B. Goennenwein[1], Rudolf Gross[1], Ruurd S. Keizer[2], Teun M. Klapwijk[2], and Arunava Gupta[3] — [1]Walther-Meissner-Insitut, Garching, Germany — [2]Kavli Institute of NanoScience, Delft, The Netherlands — [3]MINT Center, Tuscaloosa, Alabama

In the last decade the interest in superconductor-ferromagnet hybrid structures has substantially increased due to their potential application in spintronics and quantum computation. Moreover the competing ordering phenomena in superconductors (S) and ferromagnets (F) lead to interesting physical effects.

We have fabricated S-F-S Josephson junctions made of the superconductor NbTiN and the ferromagnet CrO_2. With its high spin polarization and large ferromagnetic domains, CrO_2 is ideally suited for the investigation of magnetization orientation dependent effects in S-F-S Josephson junctions. We have investigated the dependence of the critical current on the magnitude and the orientation of the external magnetic field of NbTiN/CrO_2/NbTiN lateral Josephson junctions, fabricated by e-beam lithography, sputtering and lift-off. We find a strongly hysteretic Fraunhofer pattern with an oscillation period which characteristically changes with the magnetization orientation. We interpret these results in terms of the total magnetic flux $B = \mu_0(H+M)$ in the structure.

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Critical current of Nb-(Nb/$Pd_{0.95}Fe_{0.05}$)-Nb Josephson junctions — •O. Vávra, W. Meindl, and C. Strunk — Institut für