TT 21: Superconductivity: Poster Session

Time: Monday 15:00–18:00 Location: Poster B

TT 21.1 Mon 15:00 Poster B

Pinning centres in ISD-MgO coated conductors — •Benjamin H. Stafford[1,2], Oleksiy Troshyn[1], Jens Hänisch[3], Rueben Hühne[2], Veit Grosse[1], Markus Bauer[1], Werner Prusseit[1], Bernhard Holzapfel[3], and Ludwig Schultz[2] — [1]THEVA Dünnschichttechnik GmbH, Rote-Kreuz-Str. 8, D-85737 Ismaning, Germany — [2]Institute for Metallic Materials, IFW Dresden, PO Box 27 01 16, D-01171 Dresden, Germany — [3]Institute for Technical Physics, Karlsruhe Institute of Technology (KIT), PO Box 36 40, D-76021 Karlsruhe, Germany

High temperature superconductor (HTS) films on long length metallic tapes, known as coated conductors, are quickly becoming a reality for use in superconducting motors and generators. One way to ensure good biaxial texturing of the HTS film is via the use of a buffer layer deposited by inclined substrate deposition (ISD). In order to improve the in-field performance of such coated conductors, nanoscale inclusions can be incorporated into the HTS layer to pin flux vortices. Until now it is not known how effectively such pinning centres can be incorporated into HTS films grown on ISD substrates due to the unique growth process of the HTS layer. In this work we have prepared $GdBa_2Cu_3O_{7-x}$ films grown heteroepitaxially on ISD-MgO buffered tapes via e-beam evaporation. We show how such nanoscale inclusions are arranged within the film. We also present data for the in-field critical current anisotropy of such films, displaying the effectiveness of the incorporated inclusions as pinning centres.

TT 21.2 Mon 15:00 Poster B

Leggett modes in superconductors without inversion symmetry — •Nikolaj Bittner[1], Dietrich Einzel[2], Ludwig Klam[1], and Dirk Manske[1] — [1]Max–Planck–Institut für Festkörperforschung, D–70569 Stuttgart, Germany — [2]Walther–Meißner–Institut für Tieftemperaturforschung, D–85748 Garching, Germany

The recent discovery of bulk superconductors without inversion symmetry has allowed for a new understanding of pairing correlations in general. These so–called non–centorsymmetric superconductors (NCS) are characterized by the existence of an antisymmetric spin–orbit coupling. As a consequence, there occurs a band splitting, accompanied with the coexistence of both singlet and triplet contributions to the superconducting gap. The band splitting implies the existence of a new massive collective mode, which was discovered by A. J. Leggett in 1966 for ordinary two–band superconductors, the so–called Leggett mode. Within the framework of the (Nambu) Matrix Kinetic Theory we show, that (i) in contrast to the case of the ordinary two–band superconductors, where the Leggett mode appears always as a massive collective excitation, its counterpart in NCS systems can be massless under certain conditions, (ii) it survives in the limit of vanishing triplet admixture $t = \Delta_{tr}/\Delta_s$ to the singlet energy gap and (iii) Anderson–Higgs mechanism leaves its mass unaffected.

TT 21.3 Mon 15:00 Poster B

Signatures of the nonequilibrium dynamics of superconductors in the pump-probe response — •Holger Krull[1], Götz S. Uhrig[2], Andreas P. Schnyder[1], and Dirk Manske[1] — [1]Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany — [2]TU Dortmund, Dortmund, Germany

We present theoretical studies of the pump-probe response of nonequilibrium superconductors coupled to optical phonons. Considering ultra-short pump pulses, the superconductor is pushed into the nonadiabatic regime. It is characterized by oscillations of the order parameter as well as by the generation of coherent phonons. Using the density matrix formalism, we compute the pump-probe response and determine signatures of the order parameter and of the phonon dynamics in the pump-probe conductivity. We find that the nonadiabatic dynamics of the superconductor is reflected in the oscillation in the conductivity as function of the delay time between pump and probe pulse.

TT 21.4 Mon 15:00 Poster B

Large Oscillations of the Magnetoresistance in Nanopatterned Thin Aluminum Films — •Christopher Espy[1], Julian Braun[1], Benjamin Lindner[1], Omri Sharon[2], Elke Scheer[1], and Yosef Yeshurun[2] — [1]Universität Konstanz, Konstanz, Germany — [2]Bar-Ilan University, Ramat Gan, Israel

With their experiments on thin superconducting cylinders Little and Parks demonstrated oscillations of the critical temperature with the flux threading the cylinder [1]. The periodicity of $\Phi_0 = h/2e$ supported the picture of a correlated two-electron state, as predicted by BCS theory. However, theoretical studies predict a h/e periodicity in ring-shaped unconventional superconductors that can arise via various mechanisms, when the ring diameter becomes comparable to the coherence length, ξ_0 [2, 3].

There is even speculation that this periodicity should be seen in rings made out of aluminum, a conventional s-wave superconductor, with diameters smaller than the coherence length, i.e. in the order of 1 μm [3]. Sochnikov et al. investigated this proposed periodicity in double network patterns of $La_{1.84}Sr_{0.16}CuO_4$ but did not find the predicted periodicity [4]. We show first results of our experiments on such double networks of aluminum nano-rings.

[1] Little, W.A. and Parks, R. D., PRL 9, 9 (1962).
[2] Vakaryuk, V., PRL 101, 167002 (2008).
[3] Loder, F. et al., PRB 78, 174526 (2008).
[4] Socknikov, I. et al., Nat. Nanotech. 5, 516 (2010).

TT 21.5 Mon 15:00 Poster B

Superconducting NbN single-photon detectors on GaAs with an AlN buffer layer — •Ekkehart Schmidt, Michael Merker, Konstantin Ilin, and Michael Siegel — Institut für Mikro- und Nanoelektronische Systeme (IMS), Karlsruher Institut für Technologie, Hertzstrasse 16, 76187 Karlsruhe, Deutschland

GaAs is the material of choice for photonic integrated circuits. It allows the monolithic integration of single-photon sources like quantum dots, waveguide based optical circuits and detectors like superconducting nanowire single-photon detectors (SNSPDs) onto one chip. The growth of high quality NbN films on GaAs is challenging, due to natural occurring surface oxides and the large lattice mismatch of about 27%. In this work, we try to overcome these problems by the introduction of a 10 nm AlN buffer layer. Due to the buffer layer, the critical temperature of 6 nm thick NbN films was increased by about 1.5 K. Furthermore, the critical current density at 4.2 K of NbN flim deposited onto GaAs with AlN buffer is 50% higher than of NbN film deposited directly onto GaAs substrate. We successfully fabricated NbN SNSPDs on GaAs with a AlN buffer layer. SNSPDs were patterned using electron-beam lithography and reactive-ion etching techniques. Results on the study of detection efficiency and jitter of a NbN SNSPD on GaAs, with and without AlN buffer layer will be presented and discussed.

TT 21.6 Mon 15:00 Poster B

THz Spectroscopy on Superconducting NbN Thin Films — •Lena Daschke[1], Uwe S. Pracht[1], Martin Dressel[1], Marc Scheffler[1], Konstantin S. Ilin[2], and Michael Siegel[2] — [1]1. Physikalisches Institut, Universität Stuttgart — [2]Institut für Mikro- und Nanoelektronische Systeme, Karlsruher Institut für Technologie

Epitaxial thin-film niobium nitride (NbN) is a conventional BCS superconductor. In presence of strong disorder, however, electronic inhomogeneities appear, which is not fully understood yet. To obtain a better insight into the physics of such disordered materials, studies on model systems such as structurally tailored films might be useful. Furthermore, disordered NbN films are used for single-photon detection devices, whose proper performance depends on a profound understanding of the superconducting properties. The studied NbN films have a T_c ranging from 10 to 15 K and the superconducting energy gap is easily accessible with THz spectroscopy (0.4 - 5.6 meV).

We investigate thin films of NbN sputtered on a sapphire substrate. With a Mach-Zehnder interferometer we measure the amplitude and phase shift of radiation transmitted through the thin-film sample. From there we can determine the real and imaginary parts of the optical conductivity. These results give information about the energy gap, Cooper pair density, and quasiparticle dynamics, including the temperature evolution of these quantities. We found that a film with 10 nm thickness roughly follows the BCS behavior, as expected. We will present results of our measurements on several different NbN samples.

TT 21.7 Mon 15:00 Poster B

Reduction of current-crowding effect in bended supercon-

ducting structures — •Ilya Charaev, Konstantin Ilin, and Michael Siegel — Institut für Mikro- und Nanoelektronische Systeme, Karlsruhe Institut für Technologie (KIT), Hertzstraße 16, 76187 Karlsruhe, Germany

Suppression of critical current Ic in superconducting structures with defects belongs to one of fundamental problems of superconductivity. One of mechanisms of suppression of Ic is a current-crowding effect, i.e. increase of current density in vicinity of defect. Detailed analysis of current-crowding effect in mesoscopic superconducting structures has been done by Clem in [1]. We demonstrate increase of the critical current of superconducting nanowires by an external magnetic field which is applied normally to the structure surface. The critical current of single-spiral nanowires with sharp bends, which play a role of artificially created defects, is 20% higher in magnetic field B = 25 mT than Ic of the same structure at B = 0 T. In case of single-spiral nanowires without sharp bends, the difference between Ic in magnetic field and Ic at B = 0 T was 5% only in good agreement with theoretical predictions. A detailed analysis of the influence of the magnetic field on transport properties of superconducting mesoscopic structures with artificial defects will be presented and discussed in terms of possible application of this effect for improvement of performance of superconducting nanowire single-photon detector.

TT 21.8 Mon 15:00 Poster B

Superconductivity in the ferecrystals $[(SnSe)_{1+\delta}]_m(NbSe_2)_1$ — •Corinna Grosse[1], Matti Alemayehu[2], Georg Hoffmann[1], Andreas Fiedler[1], Olivio Chiatti[1], Anna Mogilatenko[1,3], David C. Johnson[2], and Saskia F. Fischer[1] — [1]Novel Materials, Humboldt-Universität zu Berlin, 10099 Berlin, Germany — [2]Department of Chemistry, University of Oregon, Eugene, OR, 97401, USA — [3]Ferdinand-Braun-Institut, Leibniz-Institut fürHöchstfrequenztechnik, 12489 Berlin, Germany

The ferecrystals $[(SnSe)_{1+\delta}]_m(NbSe_2)_1$ are novel layered materials consisting of single-layer $NbSe_2$ sheets alternately stacked with m double layers of SnSe. $NbSe_2$ exhibits interesting electrical properties such as charge density waves and superconductivity. In contrast to conventional misfit layer compounds, ferecrystals are turbostratically disordered and the individual layer thicknesses are tunable.

We investigate the structural and electrical properties of the ferecrystals $[(SnSe)_{1+\delta}]_m(NbSe_2)_1$. The crystal structure was analyzed using scanning transmission electron microscopy, visualizing the ferecrystal layer structure on the atomic scale. The ferecrystals were characterized by measuring in-plane resistivity, magnetoresistance and Hall coefficients. A superconducting transition was observed in the resistivity measurements. The transition temperatures and the in-plane and cross-plane coherence lengths were investigated as a function of the thickness of the SnSe layers, which separate the $NbSe_2$ single-layers. The relationship between the coherence lengths and the atomic structure of these quasi-two-dimensional materials is discussed.

TT 21.9 Mon 15:00 Poster B

Superconductivity and ferromagnetism in nanostructured Bi_3Ni — •R. Schönemann[1], T. Herrmannsdörfer[1], H. Kühne[1], Z. Zhang[1], M. Naumann[1], R. Skrotzki[1,2], M. Kaiser[2], M. Heise[2], M. Ruck[2], K. Kummer[3], D. Graf[4], and J. Wosnitza[1] — [1]Dresden High Magnetic Field Laboratory (HLD), Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany — [2]Department of Chemistry and Food Chemistry, TU Dresden, Dresden, Germany — [3]European Synchrotron Radiation Facility (ESRF), Grenoble, France — [4]National High Magnetic Field Laboratory and Department of Physics, Florida State University, Tallahassee, Florida, USA

We have demonstrated the coexistence of superconductivity and ferromagnetism in Bi_3Ni nanostructures which have been prepared by making use of novel chemical-reaction paths [1]. Here, we present recent experiments on new nanostructures, such as supercrystals consisting of packed Bi_3Ni nanofibers. We have investigated their structural, magnetic and electrical-transport properties by means of NMR, XMCD, SQUID magnetometry and ac-resistance measurements. In agreement with x-ray diffraction experiments, the ^{209}Bi NMR spectra indicate a distribution of local structural parameters in the Bi_3Ni nano fibres. While bulk Bi_3Ni is nonmagnetic, XMCD measurements on nanostructured Bi_3Ni indicate a magnetic $3d^8$ configuration of Ni. Resistivity measurements demonstrate that superconductivity persists well above the Pauli limiting field - with strong anisotropy.

[1] T. Herrmannsdörfer, R. Skrotzki, J. Wosnitza, D. Köhler, R. Boldt, M. Ruck, Phys. Rev. B 83, 140501 (R) (2011).

TT 21.10 Mon 15:00 Poster B

Superconductivity in the unconventional high pressure phase bismuth-III — •Konstantin Semeniuk, Philip Brown, Aleksandar Vasiljkovic, and Malte Grosche — University of Cambridge, Cambrige, The United Kingdom

One of the most surprising developments in high pressure research was the realisation that many elements assume very unexpected high pressure structures, described in terms of extremely large or even infinite unit cells. Elemental bismuth, which has been known to undergo a series of pressure induced structural transitions between 25 kbar and 80 kbar, is an interesting example: the intermediate pressure Bi-III phase has a complex 'host-guest' structure consisting of two incommensurate sublattices. Since the unit cell is infinitely large, the description of electronic and lattice excitations is problematic. Apart from its metallic character and the observation of superconductivity at low temperature, little is known about the electronic structure in this phase.

We investigate the electrical resistivity within the metallic Bi-III phase under high hydrostatic pressure and in applied magnetic field using a piston cylinder cell. Superconductivity is observed below 7.1 K, and we extract the temperature dependence of the upper critical field, which exceeds 2 T at low temperature. The normal state resistivity exhibits an approximately linear temperature dependence. This could be attributed to strong scattering from low-lying excitations, as caused by an unusually soft phonon spectrum. The results suggest that strong coupling superconductivity arises within the host-guest structure of Bi-III out of an unusual electronic state.

TT 21.11 Mon 15:00 Poster B

Antimony Substitution in SmFeAsO — •Daniel Schmidt and Hans F. Braun — Universität Bayreuth

In the iron based compounds structural and magnetic phase transitions can be suppressed by applying external hydrostatic pressure and superconductivity emerges. Beside hydrostatic pressure, it is possible to apply chemical pressure by the substitution of atoms in the compounds with smaller ones. Such a substitution was successful for example in $LaFeAs_{1-x}P_xO$, where the parent compound shows a structural and a spin-density-wave transition and the P doped samples become superconducting. We are interested in the opposite way and substitute the As by the bigger Sb. In literature, the substitution in the La-1111 compounds was possible up to a substitution level of 40 %. With Sm, instead of La, we used a smaller rare-earth metal. We present the results obtained on polycrystalline samples characterized by Xray powder diffraction and resistivity measurements.

TT 21.12 Mon 15:00 Poster B

Impact of Y and Mn-codoping on magnetism and superconductivity in $La_{1-z}Y_zFe_{1-y}Mn_yAsO_{1-x}F_x$ — •Rhea Kappenberger[1], Franziska Hammerath[1,2,3], Mesfin Asfaw Afrassa[1,4], Pietro Carretta[2], Samuele Sanna[2], Rowena Wachtel[1], Christian G.F. Blum[1], Anja Wolter-Giraud[1], Sabine Wurmehl[1,3], and Bernd Büchner[1,3] — [1]IFW Dresden, Institute for Solid State Research, D-01171 Dresden, Germany — [2]Dipartimento di Fisica and Unitá di CNISM di Pavia, Pavia, Italy — [3]Institut für Festkörperphysik, TU Dresden, Dresden, Germany — [4]Addis Ababa University, Addis Ababa, Ethiopia

It has been shown by Kamihara et al. [1] that F doping of the iron oxypnictide LaFeAsO leads to the emergence of superconductivity. Doping of the parent compound with Y on the La site also increases T_c [2], whereas Mn doping on the Fe site has been reported to have a detrimental effect to superconductivity [3,4]. We investigated the interplay of doping by substituting those different positions at the same time. The samples where characterized using EDX, XRD, SQUID and μSR. It was shown that Y doping indeed has a stabilizing effect on the superconductivity even in the presence of small amounts of Mn.

[1] Y. Kamihara et al., J. Am. Chem. Soc. 130, 3296 (2008).
[2] H. Takahashi, K. Igawa, K. Arii, Y. Kamihara, M. Hirano, and H. Hosono, Nature London 453, 376 (2008).
[3] D. Berardan, L. Pinsard-Gaudart, and N. Drago, J. Alloys Compd. 481, 470 (2009).
[4] F. Hammerath et al., Phys. Rev. B 89, 134503 (2014).

TT 21.13 Mon 15:00 Poster B

Observation of the Josephson effect on Ba-122 iron pnictide single crystals — •Noor Hasan[1], Stefan Schmidt[1], Sebastian Döring[1], Volker Tympel[1], Frank Schmidl[1], Paul Seidel[1], and Thomas Wolf[2] — [1]Friedrich-Schiller- Universität Jena , In-

stitut für Festkörperphysik , Helmholtzweg 5, 07743 Jena, Germany — [2]Karlsruhe Institute of Technology, Institut für Festkörperphysik , Hermann-von- Helmholtz-Platz 1, 76344 Eggenstein-Leopoldshafen, Germany

Since the discovery of the first Fe-based superconductors in 2006, extensive effort has been directed characterizing and modeling the novel properties of these exotic materials. Therefore Josephson junction offer ways to investigate the fundamental properties of iron pnictides. We use $Ba(Fe_{1-x}Co_x)_2As_2$ single crystals, prepared by a self-flux method , with an optimal Co concentration of 0.065 (critical temperature T_c=23.5K) . We realize Josephson junctions along the c-axis. To prepare them a newly developed surface polishing as well as standard thin film technologies are used. The artificial barrier consists of thin sputtered layers of various materials, normal conductors as well as insulators. A thermally evaporated double layer film of Pb and In was used as the counter electrode. For the characterization of the Josephson effect we will present temperature dependent I-V characteristics as well as $I_cR_n - T$ dependencies and measurements under microwave radiation, including. Additionally results from tunneling and Andreev spectroscopy i.e temperature dependent dI/dV - V spectra are shown.

TT 21.14 Mon 15:00 Poster B

Pressure and field dependence of superconductivity in $RbFe_2As_2$ — •Pascal Reiss[1], Konstantin Semeniuk[1], Philip Brown[1], Kai Grube[2], Thomas Wolf[2], Peter Adelmann[2], Hilbert von Löhneysen[2], and F Malte Grosche[1] — [1]Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, United Kingdom — [2]Institut für Festkörperphysik, Karlsruher Institut für Technologie, 76131 Karlsruhe, Deutschland

$RbFe_2As_2$ is a member of the extensively investigated family of 122 iron based superconductors AFe_2As_2. It acts as the link between A=K and Cs, and as extremal hole-doping for A=Sr and Ba. The nature of the superconducting state in these compounds is still open, but likely to feature different nodal gap structures.

We report resistivity measurements of very pure (RRR > 1000) crystals of $RbFe_2As_2$. Superconductivity at ambient pressure and zero field is observed below 2.8K. We follow this transition and the upper critical field as a function of hydrostatic pressure up to 30 kbar.

Furthermore we observe a non-Fermi liquid form for the temperature dependence of the resistivity in the normal state, which we track as a function of pressure and applied magnetic field.

TT 21.15 Mon 15:00 Poster B

Electronic correlations in the superconductors AFe_2As_2 with A = K, Rb, and Cs — •Kai Grube[1], Felix Eilers[1], Diego A. Zocco[1], Peter Schweiss[1], Rolf Heid[1], Thomas Wolf[1], and Hilbert von Löhneysen[1,2] — [1]Karlsruhe Institute of Technology, Institut für Festkörperphysik, 76021 Karlsruhe, Germany — [2]Karlsruhe Institute of Technology, Physikalisches Institut, 76131 Karlsruhe, Germany

Superconductivity in iron pnictides and chalcogenides occurs in the proximity to antiferromagnetic order, giving rise to the assumption that the superconductivity is unconventional and originates from electron-electron interactions. So far, experimental and theoretical studies underpin this assumption but fail to unravel the pairing mechanism. A central question is the role of electronic correlations in these materials. We have investigated the thermal expansion and magnetostriction of the stoichiometric compounds AFe_2As_2 with A = K, Rb, and Cs. Our measurements show a huge increase of the effective mass quasiparticles m_{eff} with increasing A ion radius, while the superconducting transition temperature T_c decreases. The relation between superconductivity and electronic correlations will be discussed by using the uniaxial pressure dependences of T_c and m_{eff} and the temperature dependence of the upper critical field.

TT 21.16 Mon 15:00 Poster B

Phase diagram of Fe-substituted $BaNi_2As_2$ — •Liran Wang[1], Anna Böhmer[1,2], Frédéric Hardy[1], Peter Schweiss[1], Thomas Wolf[1], and Christoph Meingast[1] — [1]Institute für Festkörperphysik,Karlsruher Institut für Technologie (KIT), 76344 Karlsruhe, Germany — [2]Department of Physics and Astronomy and Ames Laboratory, Iowa State University, Ames, Iowa 50011, USA

Recently, the phosphorus doped $BaNi_2As_2$[1] system was found to exhibit a large increase of T_c upon suppression of the structural transition, which was attributed to a large phonon softening at the critical concentration[2]. Here, we investigate the closely related $Ba(Ni_{1-2}Fe_x)_2As_2$ system, mostly on the iron-rich side, using high-resolution thermal expansion, specific heat, magnetization and resistivity measurements. We find a very similar suppression of the structural transition with Fe- as with P-doping, but do not find an enhanced superconducting transition. However, both the thermal expansion and resistivity exhibit anomalously large anomalies around the critical doping region, which are shown to be of non phononic origin. We discuss similarities and differences between both Fe- and P-substituted systems.

[1] N. Kurita et al., Phys. Rev. Lett. 102, 147004 (2009).
[2] K. Kudo et al., Phys. Rev. Lett. 109, 097002 (2012).

TT 21.17 Mon 15:00 Poster B

Optical measurements on iron pnictides containing Eu — •David Neubauer[1], Andreas Baumgartner[1], Johannes Merz[1], Sina Zapf[1], Saicharan Aswartham[2], Sabine Wurmehl[3], Wen-He Jiao[4], Guang-Han Cao[4], and Martin Dressel[1] — [1]1. Physikalisches Institut, Universität Stuttgart, Germany — [2]University of Kentucky, Lexington, USA — [3]IFW, Dresden, Germany — [4]Zhejiang University, Hangzhou, China

The interplay of magnetism with superconductivity is a fascinating, highly debated field of research and many questions still remain unsolved. Members of the $EuFe_2As_2$ family are a perfectly suited playground for investigations concerning this topic, due to the peculiarity of strong local magnetism of the europium ($T_N \approx$ 20K), which is a unique feature among the 122 iron pnictides. Optical studies of the parent compound have already revealed that the spin density wave formation deviates from the other 122 pnictides [1]. To get more insight into the superconducting properties of the $EuFe_2As_2$ family we carried out an optical study on differently doped samples. We compare $Eu(Fe_{1-x}Ir_x)_2As_2$ where electron doping takes place directly in the conducting iron layer, with $EuFe_2(As_{1-x}P_x)_2$ which corresponds to isovalent substitution at atomic positions out of the Fe-plane. The influence of the Eu is furthermore investigated by placing data we obtained on $Ba_{0.6}Eu_{0.4}(Fe_{1-x}Co_x)_2As_2$ in juxtaposition to the already highly investigated pure Ba analogue.

[1] D. Wu *et al.*, Phys. Rev. B **79**, 155103 (2009).

TT 21.18 Mon 15:00 Poster B

Persistent detwinning of $EuFe_2As_2$ by small magnetic fields — •Jannis Maiwald[1], Christian Stingl[1], Sina Zapf[2], Shuai Jiang[2], Nora Bach[1], Kirk Post[3], H. S. Jeevan[1], David Neubauer[2], Anja Löhle[2], Conrad Clauss[2], Dimitri Basov[3], Martin Dressel[2], and Philipp Gegenwart[1] — [1]Experimentalphysik VI, Universität Augsburg, Germany — [2]1.Physikalisches Institut, Universität Stuttgart, Germany — [3]Department of Physics, UC San Diego, USA

The formation of twin domains in the orthorhombic phase of high-temperature superconductors is impeding the investigation of the in-plane anisotropy of these materials. Recently, we have shown how the brief application of a small magnetic field of $\sim$ 1 Tesla in the $EuFe_2As_2$ iron pnictide leads to a substantial detwinning of the system, which is persistent up to the structural transition at $\sim$ 190 K even after the magnetic field has been switched off. This offers researchers the opportunity to investigate the detwinned iron arsenide without the application of any external symmetry breaking force, like the pressure of a mechanical clamp, or a magnetic field present during measurement. We will present angular dependent magnetoresistance, magnetostriction, thermal expansion and thermoelectric power measurements on the $EuFe_2As_2$ parent compound as well as on various doped variants in order to shed further light on the mechanism behind the field induced detwinning, i.e. the interplay of the involved magnetic moments stemming form the Eu and Fe atoms in these compounds.

TT 21.19 Mon 15:00 Poster B

Phase diagrams of $Ca(Fe,Ru)_2As_2$ system — •Kan Zhao and Philipp Gegenwart — Experimentalphysik VI, Elektronische Korrelationen und Magnetismus, Institut für Physik, Universität Augsburg, D-86135 Augsburg, Germany

Single crystalline $Ca(Fe,Ru)_2As_2$ series have been grown and characterized by structural, magnetic, and transport measurements. These measurement shows $Ca(Fe,Ru)_2As_2$ undergoes successive phase transitions with increasing Ru element doping. The antiferromagnetic phase with orthorhombic structure at x<0.023 (x means the doping concentration of Ru element) is directly driven to a Fermi-liquid type collapsed tetragonal (cT) phase at 0.023<x<0.07, with no superconducting region between the two phase, consistent with the conclusion of

$CaFe_2As_2$ under hydrostatic pressure.

TT 21.20 Mon 15:00 Poster B

Pressure-induced superconductivity in $BaFe_2As_2$: optical study — •Ece Uykur[1], Tatsuya Kobayashi[2], Wataru Hirata[2], Shigeki Miyasaka[2], Setsuko Tajima[2], and Christine Kuntscher[1] — [1]Experimentalphysik II, Universität Augsburg, D-86195 Augsburg, Germany — [2]Department of Physics, Graduate School of Science, Osaka University, Osaka 560-0043, Japan

In previous studies, the superconductivity that arises from the antiferromagnetic state with various carrier dopings in iron-pnictide superconductors was demonstrated. Moreover, the external pressure induced superconductivity was shown by transport measurements. External pressure is a clean way to induce superconductivity compared to impurity doping cases. Moreover, it does not introduce additional carriers to the system. In this study, we performed temperature-dependent reflectivity measurements in $BaFe_2As_2$ parent compound under pressure (up to 5 GPa). At temperatures above the magnetic phase transition, the metallicity of the system is increasing with pressure. At lower temperatures, with increasing pressure the partial suppression of the magnetically ordered (SDW) state and the appearance of the superconducting (SC) state is observed at 3.6 and 4.2 GPa. At these pressures the SDW state and the SC state coexist. Moreover, the SC gap shows a full gap tendency below $\sim$95 cm^{-1}.

TT 21.21 Mon 15:00 Poster B

Scanning tunneling microscopy study on $CaFe_2As_2$ surface — •Philipp Ansorg[1], Philip Willke[1], Kalobaran Maiti[2], Neeraj Kumar[2], Sudesh Kumar Dhar[2], Arumugum Thamizhavel[2], and Martin Wenderoth[1] — [1]IV. Physikalisches Institut, Friedrich-Hund-Platz 1, 37077 Göttingen — [2]Tata Institute of Fundamental Research Homi Bhabha Road, Colaba Mumbai-400 005, India

The discovery of high temperature superconductivity in cuprates leads to a great interest to examine also Fe-based systems. Superconductivity in the pnictide $CaFe_2As_2$ as a parent compound is induced by pressure or substitution of Fe by Co, Ni or other dopants.[1] Here we investigate the surface of $CaFe_2As_2$ by scanning tunneling microscopy and spectroscopy. Therefore the crystal [2] is cleaved under UHV conditions and cooled below the structural transition temperature of $T_S \approx$ 173K by LN_2 or LHe. As found in similar systems [3] our STM data indicates a 2×1 surface reconstruction in the Ca layer at temperatures of both 6K and 77K. Furthermore anti-phase boundaries [4] along the 2×1 reconstruction can be observed.

[1] Y. Kamihara et al., J. Am. Chem. Soc. 128, 10012 (2006)
[2] G. Adhikary et al., J. Appl. Phys. 115, 123901 (2014)
[3] B. Saparov et al., Scientific Reports 4, 4120 (2014)
[4] K. Löser et al., Phys. Rev. B, 86, p. 085303 (2012)

TT 21.22 Mon 15:00 Poster B

High energy spectra on Fe-based unconventional superconductors — •Pranab Kumar Nag[1], Danny Baumann[1], Ronny Schlegel[1], Robert Beck[1], Sabine Wurmehl[1,2], Thomas Wolf[3], Bernd Büchner[1,2], and Christian Hess[1] — [1]Leibniz-Institute for Solid State and Materials Research, IFW-Dresden, 01171 Dresden, Germany — [2]Institut für Festkörperphysik, TU Dresden, D-01062 Dresden, Germany — [3]Karlsruher Institut für Technologie, Institut für Festkörperphysik, Postfach 3640, D-76021 Karlsruhe

We have performed low-temperature scanning tunneling microscopy and spectroscopy on LiFeAs, Co doped NaFeAs and FeSe superconductors. The spectroscopy data routinely reveal important aspects of the electronic structure both very close to the Fermi level, i.e. the superconducting gap, and distinct features at higher energies. The latter appear in occupied states roughly between -0.3 eV and -0.5 eV in these materials, and allow specific comparison with ARPES band structure data.

TT 21.23 Mon 15:00 Poster B

Ferromagnetic Phase Transition in Li deficient LiFeAs — •Uwe Gräfe[1], Shiv Jee Singh[1], Robert Beck[1], Sabine Wurmehl[1,2], Christian Hess[1,3], and Bernd Büchner[1,2,3] — [1]IFW Dresden, Helmholtzstraße 20, 01069 Dresden — [2]TU Dresden Institut für Festkörperphysik, 01062 Dresden — [3]Center for Transport and Devices, Technische Universität Dresden, 01069 Dresden, Germany

While other iron pnictides only develop superconductivity under doping with holes or electrons, LiFeAs is a stoichiometric superconductor. So far doping, e.g. electron doping with Co [1] or Ni [2], is supressing the superconducting transition temperature. The same holds true for Li deficiency which formally corresponds to hole doping. This deficiency also leads to a ferromagnetic phase transition, evidenced by, e.g. magnetization and temperature dependent NQR measurements. Interestingly, upon doping LiFeAs with electrons, the NQR frequency at room temperature is shifted to lower values and vice versa for holes, i.e., the NQR frequency can be used as an absolute reference for the carrier doping in the material. Here we present systematic, NQR-controlled studies of the impact of various doping schemes on the structural, magnetic, and transport properties.

[1] Aswartham *et al.* 2011, PRB **84** 054534
[2] Pitcher *et al.* 2010, JACS **132** 10467

TT 21.24 Mon 15:00 Poster B

Superconductivity from Magnetic Fluctuations in $FeTe_{1-x}Se_x$-Feedback of Double Stripe Magnetism on Itinerant Spin Excitations — •Masoud Mardani[1], Johannes Knolle[2], Ilya Eremin[3], and Roderich Moessner[1] — [1]Max Planck Institute for the Physics of Complex Systems, D-01187 Dresden, Germany — [2]TCM Group, Cavendish Laboratory, University of Cambridge, Cambridge CB3 0HE, United Kingdom — [3]Institute for Theoretical Physics III, Ruhr-Universität Bochum, D-44801 Bochum, Germany

Iron-chalcogenide superconductors exhibit an unusual double stripe antiferromagnetic parent phase with ordering vector $Q_{AF} = (\pi/2,\pi/2)$ (in the one iron unit cell). In addition, magnetic excitations in optimally doped systems are peaked at momenta $Q_{SF} = (\pi,0)/(0,\pi)$, which is in contrast to most other families of iron-based superconductors. There, both the magnetic order of the parent compounds and the magnetic fluctuations in the superconducting state have the same momentum Q_{SF}, which is taken as a strong argument in favor of spin-fluctuation induced superconductivity. Here, we model iron-chalcogenides as a system of itinerant electrons coupled to localized electrons responsible for the double stripe magnetism. We study the feedback of this unusual magnetic order on the itinerant spin excitations at Q_{SF} and show that they increase with decreasing magnetism. We make connection to recent INS experiments and reproduce qualitatively the behavior of magnetic excitations in $FeTe_{1-x}Se_x$ from x=0 towards x=0.4.

TT 21.25 Mon 15:00 Poster B

Structural and superconducting properties of epitaxial $Fe_{1+y}Se_{1-x}Te_x$ thin films — •Stefan Richter[1], Feifei Yuan[1], Vadim Grinenko[1], Alberto Sala[2], Marina Putti[2], and Ruben Hühne[1] — [1]Institute for Metallic Materials IFW Dresden — [2]Dipartimento di Fisica, Università di Genova

The iron based superconductor Fe(Se,Te) is in the center of much ongoing research. The reason for this is on the one hand its simple crystal structure, that consists only of stacked Fe(Se,Te) layers so that structural and superconducting properties can be connected more easily, on the other hand FeSe itself shows a high sensibility for strain and changes in stoichiometry and can have potentially very high critical temperatures under hydrostatic pressure or in monolayers.

We investigate epitaxial thin films of $Fe_{1+y}Se_{1-x}Te_x$ grown by pulsed laser deposition on different single crystalline substrates. A high crystalline quality and a superconducting transition of up to about 20 K can be achieved using optimized deposition parameters. The influence of growth conditions, Te-doping, film thickness and post growth oxygen treatment on the structural and superconducting properties on these films will be presented in detail.

TT 21.26 Mon 15:00 Poster B

Coexistence of 3*d*-Ferromagnetism and Superconductivity in $(Li_{1-x}Fe_xOH)(Fe_{1-y}Li_ySe)$ — •Felix Brückner[1], Rajib Sarkar[1], Sirko Kamusella[1], Hubertus Luetkens[2], Ursula Pachmayr[3], Fabian Nitsche[3], Hans-Henning Klauss[1], and Dirk Johrendt[3] — [1]Institut für Festkörperphysik, Technische Universität Dresden, Germany — [2]Paul-Scherrer-Institut, Villigen, Switzerland — [3]Department Chemie, Ludwig-Maximilians-Universität München, Germany

In the family of iron-based superconductors, where the superconducting dome is usually separated from the magnetic phase, only few compounds show ferromagnetism arising in the superconducting state. The so far discovered examples show ferromagnetic ordering of Eu^{2+} ions. In this context, the presented ordering of iron orbitals in $(Li_{1-x}Fe_xOH)(Fe_{1-y}Li_ySe)$ is unique.

We performed a wealth of experimental methods to characterize

the physics in this system, including dc resistivity and magnetization. With use of local probes (μSR,NMR,Mößbauer), we are able to describe the emergence of bulk ferromagnetism and superconductivity in a microscopic scale. Both phenomena can coexist, though they compete with each other, due to a spatial separation in the multilayer system.

TT 21.27 Mon 15:00 Poster B

Transport Properties of FeAs Single Crystals — •Matthias Gillig[1], Seunghyun Khim[1], Sabine Wurmehl[1,2], Bernd Büchner[1,2], and Christian Hess[1,3] — [1]Institute for Solid State Research, IFW Dresden, 01069 Dresden, Germany — [2]Technische Univeristät Dresden, 01069 Dresden, Germany — [3]Center for Transport and Devices, Technische Universität Dresden, 01069 Dresden, Germany

The electronic properties of all FeAs-based superconductors are primarily determined by the electronic states of the FeAs layers in these compounds. The physical properties of binary compound FeAs are therefore of general interest, despite the different structure as compared to that of hypothetical isolated FeAs-layers in the superconducting compounds. More specifically, FeAs crystallizes in an orthorhombic structure containing distorted $FeAs_6$ octahedra, instead of the $FeAs_4$ tetrahedra of the layers in the superconductors.

We have performed transport measurements on FeAs single crystals along all crystallographic directions. The resistivity is only weakly anisotropic and possesses a temperature dependence with a positive slope but a rather unusual non-linear behaviour. For temperatures $T \gtrsim 200$ K the resistivity is only weakly temperature dependent up to room temperature. However, below ~ 200 K the resistivity drops strongly upon cooling and exhibits a sharp kink at the spin density wave transition at ~ 70 K, resembling the unusual normal state resistivity of many Fe-based superconductors.

TT 21.28 Mon 15:00 Poster B

Superconducting properties and pseudogap from preformed Cooper pairs in the triclinic $(CaFe_{1-x}Pt_xAs)_{10}Pt_3As_8$ — •M. A. Surmach[1], F. Brückner[1], S. Kamusella[1], R. Sarkar[1], P. Y. Portnichenko[1], J. T. Park[2], G. Ghambashidze[3], H. Luetkens[4], P. Biswas[4], W. J. Choi[5], Y. I. Seo[5], Y. S. Kwon[5], H.-H. Klauss[1], and D. S. Inosov[1] — [1]TU Dresden, Germany — [2]MLZ, Garching, Germany — [3]MPI, Stuttgart, Germany — [4]PSI, Villigen, Switzerland — [5]DGIST, Daegu, Republic of Korea

Using μSR, INS and NMR, we investigated the novel Fe-based superconductor with a triclinic crystal structure $(CaFe_{1-x}Pt_xAs)_{10}Pt_3As_8$ ($T_c = 13$ K). The T-dependence of the superfluid density from the μSR measurements indicates the presence of two superconducting gaps. Our INS data revealed commensurate spin fluctuations at the $(\pi, 0)$ wave vector. Their intensity remains unchanged across T_c, indicating the absence of a spin resonance typical for many Fe-pnictides. Instead, we observed a peak around $\hbar\omega_0 = 7$ meV at the same wave vector, which persists above T_c and is characterized by the ratio $\hbar\omega_0/k_BT_c \approx 6.2$, i.e. significantly higher than typical values for the magnetic resonant modes in iron pnictides (~ 4.3). The T-dependence of magnetic intensity at 7 meV revealed an anomaly around $T^* = 45$ K related to the disappearance of this new mode. A suppression of the spin-lattice relaxation rate, $1 = /T_1T$, observed by NMR immediately below T^* without any notable subsequent anomaly at T_c, indicates that T^* could mark the onset of a pseudogap in $(CaFe_{1-x}Pt_xAs)_{10}Pt_3As_8$, likely associated with the emergence of preformed Cooper pairs.

TT 21.29 Mon 15:00 Poster B

$SrCo_2P_2$: a rare case of strong T dependence in the uncorrelated electronic DOS — •Christoph Bergmann, Helge Rosner, Yurii Prots, and Christoph Geibel — Max Planck Institut Chemical physics of solids, Dresden, Germany

Since the discovery of high temperature superconductivity in doped RFeAsO, transition metal pnictides have attracted considerable attention, especially those being close to a transition from a magnetic ordered to a non-magnetic ground state. $SrCo_2P_2$, a structural homologue of the AFe_2As_2 series of compounds, is such a system. Earlier investigation on polycrystals indicated a paramagnetic ground state, but a close proximity to magnetic ordering. Using a flux technique, we grew high quality single crystals with a residual resistivity ratio up to 150, and performed an in-depth study of the physical properties. Despite DFT calculation indicate a pronounced peak in the density of states at the Fermi level prone for electronic instability. We did not find any evidence for a phase transition. However we observed a quite unusual temperature dependence of the susceptibility with two distinct maxima, and Non-Fermi-liquid behavior in the resistivity at low temperature. Temperature dependent x-ray scattering experiments reveal an unusual behavior of the structural parameters, which induces a strong temperature dependence of the DOS at the Fermi edge. This provides a mechanism for the low temperature maximum, observed in the magnetic susceptibility.

TT 21.30 Mon 15:00 Poster B

QSGW+DMFT: an electronic structure scheme for the iron pnictides and beyond — •Jan Martin Tomczak — Institute of Solid State Physics, Vienna University of Technology, A-1040 Vienna, Austria

While in strongly correlated materials one often focuses on local electronic correlations, non-local exchange and correlation effects beyond band-theory can influence the physics of some systems even on a qualitative level. Here, I will argue that this is the case for the iron pnictide and chalcogenide superconductors. As an approach to tackle their electronic structure, I will detail the implementation of the recently proposed scheme that combines the quasi-particle self-consistent GW approach with dynamical mean-field theory: QSGW+DMFT [1,2]. I will showcase the possibilities of QSGW+DMFT with a simplified application on $BaFe_2As_2$. Further, I will discuss the empirical finding that in the iron pnictides and chalcogenides dynamical and non-local correlation effects separate within the quasi-particle band-width.

[1] arXiv:1411.5180.
[2] Phys. Rev. Lett. 109, 237010 (2012).

TT 21.31 Mon 15:00 Poster B

Persistent circular currents around holes in graphite interfaces — •Bogdan Semenenko, Annette Setzer, Winfried Böhlmann, and Pablo Esquinazi — Division of Superconductivity and Magnetism, Institut für Experimentelle Physik II, Universität Leipzig, D-04103 Leipzig, Germany

To prove the existence of persistent circular currents around artificially made holes in graphite flakes with embedded interfaces we used highly oriented pyrolytic graphite (HOPG) with a large density of interfaces. The presence of interfaces in HOPG is responsible for the metallic-like behavior as well as for the superconductivity found in some graphite materials [1,2]. We performed high precision magnetic measurements using a SQUID at temperatures from 5 K to 300 K and maximum magnetic fields between 0.05 T and 5 T applied normal to the holes area. The holes of ~ 2 μm diameter were produced using a focused Ga^+ beam microscope. The rest of the graphite surface was protected by a thick layer of PMMA. The measurements show that if we drill holes in the HOPG it is possible to see a relatively large magnetic moment, which remains persistent after removing the applied field. We speculate that this signal originates from circular currents around the holes that flow at the different interfaces (about 100 within the thickness of the graphite flake used).

[1] P. Esquinazi, T. T. Heikkilä, Y. V. Lysogoskiy, D. A. Tayurskii, and G. E. Volovik, JETP Letters **100**, 336 (2014).
[2] A. Ballestar et al., New Journal of Physics **15**, 023024 (2013).

TT 21.32 Mon 15:00 Poster B

Andreev reflections in single C_{60} junctions — •Jonathan Brand, Nicolas Néel, and Jörg Kröger — Institut für Physik, Technische Universität Ilmenau, D-98693 Ilmenau, Germany

Single C_{60} molecules deposited on an ultrathin oxide film on Nb(110) were investigated using a low-temperature scanning tunnelling microscope. Spectroscopy of the differential conductance (dI/dV) in the tunnelling range reveals proximity-induced superconductivity in junctions comprising the oxide layer as well as single C_{60} molecules. Andreev reflections are enhanced upon controllable fabrication of tip-surface contacts, which is reflected by the gradual transformation of the superconducting energy gap into a characteristic zero-bias peak in dI/dV spectra. The current-voltage characteristics of the tunnelling and contact junctions are modelled within the Blonder-Tinkham-Klapwijk theory [1].

[1] G. E. Blonder, M. Tinkham, and T. M. Klapwijk, Phys. Rev. B **25**, 4515 (1982).

TT 21.33 Mon 15:00 Poster B

Ordinary and Triplet Superconducting Spin Valve Effect in Fe/Pb based systems — •Pavel Leksin[1], Nadir Garifyanov[2], Ilgiz Garifullin[2], Yakov Fominov[3], Joachim Schumann[1], Yu-

lia Krupskaya[1], Vladislav Kataev[1], Christian Hess[1], Oliver Schmidt[1], and Bernd Büchner[1] — [1]Leibniz Institute for Solid State and Materials Research IFW Dresden, Germany — [2]Zavoisky Physical-Technical Institute of RAS, Kazan, Russia — [3]L. D. Landau Institute for Theoretical Physics of RAS, Moscow, Russia

We report on experimental evidence for the occurrence of the long range triplet correlations (LRTC) of the superconducting (SC) condensate in the spin-valve heterostructures CoO_x/Fe1/Cu/Fe2/Pb [1]. The LRTC generation in this layer sequence is accompanied by a T_c suppression near the orthogonal mutual orientation of the Fe1 and Fe2 layers' magnetization. This T_c drop reaches its maximum of 60mK at the Fe2 layer thickness $d_{Fe2} = 0.6$ nm and falls down when d_{Fe2} is increased. The modification of the Fe/Pb interface by using a thin Cu layer between Fe and Pb layers reduces the SC transition width without preventing the interaction between Pb and Fe2 layers. The dependence of the SSVE magnitude on Fe1 layer thickness d_{Fe1} reveals maximum of the effect when d_{Fe1} and d_{Fe2} are equal and the d_{Fe2} value is minimal [2]. Using the optimal d_{Fe1}, d_{Fe2} and the intermediate Cu layer we realized almost full switching from normal to SC state due to SSVE.

[1] P. V. Leksin et al, Phys. Rev. Lett. 109, 057005 (2012).
[2] P. V. Leksin et al., JETP Lett., vol. 97, iss. 8 (2013).

TT 21.34 Mon 15:00 Poster B

Thickness Dependence of the Triplet Spin-Valve Effect in Superconductor-Ferromagnet Heterostructures — •Daniel Lenk[1], Vladimir I. Zdravkov[1,2], Jan Kehrle[1], Günther Obermeier[1], Roman Morari[1,3], Hans-Albrecht Krug von Nidda[1], Claus Müller[1], Anatolie S. Sidorenko[3], Siegfried Horn[1], Reinhard Tidecks[1], and Lenar Tagirov[4] — [1]Institut für Physik, Universität Augsburg, D-86159 Augsburg, Germany — [2]Present address: Institut für angewandte Physik, Universität Hamburg, D-20355 Hamburg, Germany — [3]D. Ghitsu Institute of Electronic Engineering and Nanotechnologies ASM, MD 2028 Kishinev, Moldova — [4]Solid State Physics Department, Kazan Federal University, 420008 Kazan, Russia

We investigated the triplet spin-valve effect in nanoscale layered $S/F_1/N/F_2/AF$ heterostructures with varying F_1-layer thickness (where S=Nb is a singlet superconducting, F_1=$Cu_{41}Ni_{59}$ and F_2=Co a ferromagnetic, and N a normal-conducting, non-magnetic layer). The theory predicts a long-range, odd-in-frequency triplet component of superconductivity at non-collinear alignment of the magnetizations of F_1 and F_2. This triplet component exhausts the singlet state and, thus, lowers the superconducting transition temperature, T_c, yielding a global minimum of T_c close to the perpendicular mutual orientations of the magnetizations. We found an oscillating decay of T_c suppression, due to the generation of the triplet component, with increasing F_1 layer thickness, which we discuss in the framework of recent theories. This work was supported by DFG Grant No. HO955/9-1.

TT 21.35 Mon 15:00 Poster B

Josephson Currents in a Weak-Link Superconductor-Ferromagnet Proximity Structure — •Jan Gelhausen[1] and Matthias Eschrig[2] — [1]Royal Holloway, University of London, United Kingdom, Universität zu Köln — [2]Royal Holloway, University of London, United Kingdom

We provide theoretical support for experimental measurements on a weak-link hybrid structure consisting of superconducting elements that are influenced by a ferromagnet (SSFS). It consists of a thin Aluminium wire that runs across a ferromagnetic disc made out of Nickel. The experimentally measured phase diagram allows for an identification of several temperature dependent system states. We numerically calculate important physical observables such as the local density of states, singlet and triplet pair amplitudes, proximity induced minigaps and their scaling behaviour with the system size, spin-magnetisations and the phase and temperature dependence of Josephson currents. The current-phase relationship of the SSFS junction is multivalued for low temperatures and approaches a sinusoidal form for increasing temperatures. This behaviour is indicative of a crossover from a Josephson-like behaviour to a junction that is dominated by a depairing current for decreasing temperatures.

TT 21.36 Mon 15:00 Poster B

Nonlocal spin-transport measurement of superconductor-ferromagnet nanostructures — •Stefan Kolenda, Michael J. Wolf, Florian Hübler, and Detlef Beckmann — Institut für Nanotechnologie, Karlsruher Institut für Technologie

We present measurements of the nonlocal conductance of nanostructures with several ferromagnetic electrodes lying perpendicular on a superconducting wire. In these strucures nonlocal conductance is mostly given by diffusion of quasiparticles, which are injected by one of the electrodes and detected by an other one. Applying a magnetic field induces a Zeeman splitting in the quasiparticals density of states, which suppreses the relaxation of injected spin imbalance, thus spin transport over distances of several micrometers is found [1][2]. While in the previous experiments the magnetic field was aligned parallel to the ferromagnetic electrodes, we also show measurements applying the magnetic field noncollinear with the magnetization of the ferromagnetic electrodes. We compare our results to the previous case.

[1] F. Hübler *et al.*, Phys. Rev. Lett. **109**, 207001 (2012)
[2] C.H.L. Quay *et al.*, Nature Phys. **9**, 84 (2013)

TT 21.37 Mon 15:00 Poster B

Upper Critical Field and Vortices in S/F Bilayers Exhibiting the Quasi-Onedimensional FFLO-like State — Daniel Lenk[1], •Mamoun Hemmida[1], Jan Kehrle[1], Vladimir I. Zdravkov[1,2], Aladin Ullrich[1], Günther Obermeier[1], Roman Morari[1,3], Claus Müller[1], Anatolie S. Sidorenko[3], Alois Loidl[1], Hans-Albrecht Krug von Nidda[1], Lenar Tagirov[1,4], Siegfried Horn[1], and Reinhard Tidecks[1] — [1]Institut für Physik, Universität Augsburg, D-86159 Augsburg, Germany — [2]Present address: Institut für angewandte Physik, Universität Hamburg, D-20355 Hamburg, Germany — [3]D. Ghitsu Institute of Electronic Engineering and Nanotechnologies ASM, MD 2028 Kishinev, Moldova — [4]Solid State Physics Department, Kazan Federal University, 420008 Kazan, Russia

We investigate the temperature dependence of the upper critical field, B_{c2}, in superconductor/ferromagnet (S/F) bilayers as a function of the F-layer thickness, d_F, by resistance measurements. We extracted GL coherence lengths and estimated an effective thickness of the superconducting layer by evaluating the perpendicular coherence length at the 3D-2D crossover temperature in the parallel B_{c2}. We found an unexpected non-monotonous behavior of the effective thickness as a function of d_F. Moreover, we investigated the anisotropy of B_{c2} by microwave absorption. The results show a deviation from Tinkham's prediction for thin films, which we attribute to the additional anisotropy induced by the quasi-1D FFLO-like state. Thus, we propose a new type of vortex, developing in the S/F bilayer in magnetic fields applied close to parallel. This work was supported by DFG Grant No. HO955/9-1.

TT 21.38 Mon 15:00 Poster B

Non-equilibrium spin and charge transport in superconducting heterojunctions — •Marcel Thalmann, Marcel Rudolf, Julian Braun, Torsten Pietsch, and Elke Scheer — Department of Physics, University of Konstanz, Universitätsstraße 10, 78464 Konstanz, Germany

Ferromagnet Superconductance (F/S) junctions are rich in exciting quantum-physical-phenomena, which are still poorly understood but may provide bright prospects for new applications. In contrast to conventional normal-metal proximity systems, Andreev reflection is suppressed for singlet cooper pairs in F/S heterostructures. However, long-range triplet pairing may be observed in S/F systems with noncollinear magnetization or spin-active interfaces.

Herein, we investigate non-equilibrium transport properties of lateral S/F heterojunctions, defined via electron beam lithography. In particular we focus microwave- and magneto-transport spectroscopy on conventional type-I (Al, Pb, Zn) and type-II (Nb) superconductors in combination with strong transition metal ferromagnets (Ni, Co, Fe). A cryogenic HF readout platform and advanced electronic filtering is developed and results on Al-based heterojunctions are shown.

TT 21.39 Mon 15:00 Poster B

Measurement setup for the magnetic penetration depth and superfluid stiffness in thin superconducting films. — •Lorenz Fuchs[1], Markus-Christopher-Paul Brunner[1], Jessica Bousquet[2], Ina Schneider[1], Klaus Kronfeldner[1], Etienne Bustarret[2], and Christoph Strunk[1] — [1]Institute for exp. and appl. Physics, University of Regensburg, Germany — [2]Institut NÉEL, Grenoble, France

A mutual inductance measurement setup has been established in order to determine the magnetic penetration depths of thin film superconductors. [1] By measuring the variation of the mutual inductance M,

the temperature dependent penetration depth can be evaluated. [2] The setup has been characterized using thin aluminum and niobium films as a reference. Temperature dependence of λ of B-doped diamond films is determined down to 0.3K and compared with theoretical expectations. [3] The impact of the doping ratio B/C and film thickness on λ and T_c is investigated. Correlation between the film impedance $\sigma = \sigma_1 - i\sigma_2$ and λ is examined.

[1] A.T. Fiory et al., Appl. Phys. Lett. **52** (25), 1988
[2] T. Lemberger et al., J. Appl. Phys. **83** (8), 1998
[3] E. Bustarret et al., Phil. Trans. R. Soc. A, 2008

TT 21.40 Mon 15:00 Poster B

Simulation of electronic structure Hamiltonians in a superconducting quantum computer architecture — •Michael Kaicher[1], Peter J. Love[2], and Frank K. Wilhelm[1] — [1]Theoretical Physics, Saarland University, 66123 Saarbrücken, Germany — [2]Department of Physics, Haverford College, Haverford, Pennsylvania 19041, USA

Quantum chemistry has become one of the most promising applications within the field of quantum computation. Simulating the electronic structure Hamiltonian (ESH) in the Bravyi-Kitaev (BK)-Basis to compute the ground state energies of atoms/molecules reduces the number of qubit operations needed to simulate a single fermionic operation to O(log(n)) as compared to O(n) in the Jordan-Wigner-Transformation. In this work we will present the details of the BK-Transformation, show an example of implementation in a superconducting quantum computer architecture and compare it to the most recent quantum chemistry algorithms suggesting a constant overhead.

TT 21.41 Mon 15:00 Poster B

Giant Atom Coupled to Surface Acoustic Waves — •Lingzhen Guo, Anton Kockum, and Göran Johansson — Department of Microtechnology and Nanoscience, MC2, Chalmers University of Technology, SE-412 96 Gothenburg, Sweden

We investigate the system of an artificial atom (transmon) coupled to surface acoustic waves (SAWs). The artificial atom is giant because the wavelength of SAWs is much smaller than that of light and comparable to the length scale of transmon. We study the situation that the giant atom has two "legs" coupling to SAWs confined in a 1D transmission line. We investigate the parameter regime where the travelling time T of SAWs between the two legs is arbitrary long. We use the time delay differential equations to describe our system and find some new phenomena when the travelling time T is much longer than the atom's relaxation time, e.g., the decay of the whole system follows a type of polynomial decay instead of exponential decay. We also investigate the transmission properties under driving and find more interesting properties of this system beyond the Markov approximation. The results we get are also true for similar systems implemented in the light cavities and circuit QED.

TT 21.42 Mon 15:00 Poster B

Terahertz emission and electromagnetic waves in single crystal $Bi_2Sr_2CaCu_2O_8$ structures — •Raphael Wieland[1], Fabian Rudau[1], Boris Gross[1], Nickolay Kinev[2], Manabu Tsujimoto[3], Min Ji[4,5], Ya Huang[4,5], Xianjing Zhou[4,5], Deyue An[4,5], Thomas Judd[1], Peihang Wu[5], Takeshi Hatano[4], Huabing Wang[4,5], Valery Koshelets[2], Dieter Koelle[1], and Reinhold Kleiner[1] — [1]Physikalisches Institut and Center for Collective Quantum Phenomena in LISA$^+$, Universität Tübingen, Tübingen, Germany — [2]Kotel'nikov Institute of Radio Engineering and Electronics, Moscow, Russia — [3]Kyoto University, Kyoto, Japan — [4]National Institute for Materials Science, Tsukuba, Japan — [5]Research Institute of Superconductor Electronics, Nanjing University, Nanjing, China

Josephson Junctions (JJs) offer a natural way to convert a dc voltage into high-frequency electromagnetic radiation. In the high-Tc superconductor $Bi_2Sr_2CaCu_2O_8$ (BSCCO), JJs form intrinsically, allowing to fabricate stacks of hundreds of junctions easily. Emission can occur at relatively low bias currents but also at larger input power with frequencies from 0.4 to 1 THz. At high bias, a hot spot forms, affecting both the intensity and the linewidth of the radiation. BSCCO mesas are believed to work as a cavity for electromagnetic standing waves, synchronizing all the junctions in the stack. We investigated THz emission and hotspot formation using a combination of transport measurements, electromagnetic wave detection via a superconducting receiver and low temperature scanning laser microscopy.

TT 21.43 Mon 15:00 Poster B

Sensitive YBCO nanoSQUIDs for the investigation of small spin systems — •Benedikt Müller[1], Tobias Schwarz[1], Roman Wölbing[1], María José Martínez-Pérez[1], Christopher F. Reiche[2], Thomas Mühl[2], Bernd Büchner[2], Reinhold Kleiner[1], and Dieter Koelle[1] — [1]Physikalisches Institut and Center for Collective Quantum Phenomena in LISA$^+$, Universität Tübingen, Auf der Morgenstelle 14, 72076 Tübingen, Germany — [2]Leibniz Institute for Solid State and Materials Research IFW Dresden, Helmholtzstr. 20, 01069 Dresden, Germany

We report on advances in the realization of dc YBCO nanoSQUIDs for continuous measurement of magnetic nanoparticle magnetization loops in strong magnetic fields up to the Tesla range, applied in the plane of the SQUID loop at temperatures of 4 K and below. Our grain boundary junction based YBCO SQUIDs are patterned by focused ion beam milling and feature a constriction next to the SQUID loop, allowing for on-chip SQUID modulation and bias reversal readout schemes.

Using numerical simulations based on London theory, the spin sensitivity $S_\mu^{1/2} = S_\Phi^{1/2}/\phi_\mu$ was improved by optimizing both the flux noise $S_\Phi^{1/2}$ and the coupling factor $\phi_\mu = \Phi/\mu$ (Φ is the magnetic flux coupled into the SQUID loop by a particle with magnetic moment μ). For optimized experimental devices, flux noise levels down to $50\,\mathrm{n}\Phi_0/\mathrm{Hz}^{1/2}$ in the white noise limit have been achieved, corresponding to a calculated spin sensitivity of only a few $\mu_\mathrm{B}/\mathrm{Hz}^{1/2}$.

Further, the magnetization reversal of a Fe filled carbon nanotube attached to a YBCO nanoSQUID was traced out.

TT 21.44 Mon 15:00 Poster B

Characterization of Josephson parametric amplifiers — •Stefan Pogorzalek[1,2,3], Kirill Fedorov[1,2,3], Ling Zhong[1,2,3], Martin Bitzenbichler[1,2,3], Max Haeberlein[1,2,3], Manuel J. Schwarz[1,2,3], Peter Eder[1,2,3], Jan Goetz[1,2,3], Friedrich Wulschner[1,2,3], Edwar Xie[1,2,3], Alexander Baust[1,2,3], Achim Marx[1,2,3], Edwin P. Menzel[1,2,3], Frank Deppe[1,2,3], and Rudolf Gross[1,2,3] — [1]Walther-Meißner-Institut, Bayerische Akademie der Wissenschaften, 85748 Garching, Germany — [2]Physik-Department, TU München, 85748 Garching, Germany — [3]Nanosystems Initiative Munich (NIM), 80799 München, Germany

Propagating quantum microwaves are a promising building block for quantum communication. In particular, such itinerant quantum microwaves can be generated in the form of squeezed photon states using Josephson parametric amplifiers (JPA). A thorough experimental characterization of JPAs is therefore an essential prerequisite for further experiments towards quantum communication. For implementing JPAs we employ an established $\lambda/4$ bi-coplanar microwave resonator design where a dc-SQUID is biased by an external flux to tune the resonant frequency. An inductively coupled antenna acts as a pump for the JPA. We characterize several JPAs and evaluate the data within standard Josephson junction theory and the input-output formalism. In particular, we investigate hysteretic and bifurcation behavior of the JPAs in addition to usual non-degenerate JPA gain measurements.

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TT 21.45 Mon 15:00 Poster B

Temperature dependence of coherence in transmon qubits — •Steffen Schlör[1], Jochen Braumüller[1], Oleksandr Lukashenko[1], Hannes Rotzinger[1], Martin Sandberg[2], Michael R. Vissers[2], David P. Pappas[2], Martin Weides[1], and Alexey V. Ustinov[1] — [1]Physikalisches Institut, KIT, 76131 Karlsruhe, Germany — [2]NIST, Boulder, CO 80305, United States

Superconducting qubits are a promising field of research, not only with respect to quantum computing but also as highly sensitive detectors and due to the possibility of using them to study fundamental implications of quantum mechanics. The requirements for qubits that can be used as building blocks in a potential quantum computer are challenging. Modern superconducting qubits like the transmon are strong candidates for achieving these goals. The main challenge here is to increase the coherence of prepared quantum states. Here, we experimentally investigate the influence of temperature variation on relaxation and dephasing of a transmon qubit. Our goal is to understand decoherence mechanisms in material optimized circuits. Aiming at longer coherence, in this case peaking over $50\,\mu\mathrm{s}$ for T_1 and T_2, our samples are fabricated at NIST using two different materials. Low-loss TiN was used for the shunt capacitance as well as the resonator, combined with shadow evaporated ultra-small Al-AlO_x-Al Josephson junctions.

We will present temperature-dependent data on qubit relaxation and dephasing times as well as power spectra. Our data will be compared to previously obtained temperature dependent data for other types of qubits.

TT 21.46 Mon 15:00 Poster B

Collective coupling of tunable transmon array via a cavity bus — •Ping Yang, Martin Weides, and Alexey V. Ustinov — Physikalisches Institut, KIT, Wolfgang-Gaede-Str. 1, 76131 Karlsruhe, Germany

Nowadays, superconducting multi-qubit circuits can be fabricated and studied experimentally. In order to manipulate the propagation of electromagnetic waves and explore the scalability of superconducting qubit circuits, we investigate coplanar waveguide resonators coupled to up to eight transmon qubits. An array of transmons can be viewed as a quantum metamaterial. Compared to a metamaterial made of flux qubits [1], our current approach using transmons anticipates smaller parameter spread and is easier to fabricate. The resonators are fabricated using optical lithography, while the qubits are made by using electron-beam lithography. Every qubit is biased individually via a flux-bias line. Thus, the interaction between the individual qubit and the resonator can be easily turned on and off by tuning the qubit eigenfrequencies. The simultaneous readout is implemented by measuring the dispersive shift of the resonator. This scheme enables one to study the collective behavior (Dicke state, quantum synchronization, superradiance) between all, or a subset of qubits.

[1] P. Macha, et al. Nature Commun. 5, 5146 (2014)

TT 21.47 Mon 15:00 Poster B

Quantum Phase-Slips in Superconducting AlO_x Nanowire Arrays at Microwave Frequencies — •Sebastian T. Skacel[1], Marco Pfirrmann[1], Jan N. Voss[1], Julian Münzberg[1], Lucas Radtke[1], Sebastian Probst[1], Martin Weides[1,2], Hannes Rotzinger[1], Hans E. Mooij[1,3], and Alexey V. Ustinov[1,4] — [1]Physikalisches Institut, Karlsruhe Institute of Technology, D-76131 Karlsruhe, Germany — [2]Institute of Physics, Johannes Gutenberg University Mainz, D-55128 Mainz, Germany — [3]Kavli Institute of Nanoscience, Delft University of Technology, 2628 CJ Delft, The Netherlands — [4]Russian Quantum Center, 100 Novaya St., Skolkovo, Moscow region, 143025, Russia

Superconducting nanowires in the quantum phase slip (QPS) regime allow to study the flux and phase dynamics in duality to Josephson junction systems. However, due to the vanishing self-capacitance of the nanowires, the microwave response significantly differs. We experimentally study parallel arrays of nanowires which are embedded in a resonant circuit at GHz frequencies. The samples are probed at ultralow microwave power and applied magnetic field at mK temperatures. The AlO_x nanowires, with a sheet resistance in the kΩ range, are fabricated by sputter deposition of aluminium in a controlled oxygen atmosphere. The wires are defined with conventional electron beam lithography down to a width of approximately 15 nm. We present the fabrication of the nanowire arrays and measurement results for arrays coupled to superconducting microwave resonators.

TT 21.48 Mon 15:00 Poster B

How to identify quantum effects in a driven current-biased JJ — •Harald Losert, Karl Vogel, and Wolfgang P. Schleich — Institut für Quantenphysik, Universität Ulm, D-89069 Ulm, Germany

The phase difference in a current-biased Josephson junction behaves like a particle in a tilted washboard potential. There has been a huge interest in the behaviour of such a particle - in particular in the case of an external periodic driving field - since the escape of the phase-particle corresponds to the voltage switching of the associated Josephson junction. Experimentally, the bias current is increased until the voltage state changes. Quantum mechanically it can be explained as tunneling from the ground state, or from an excited state. However, the resulting switching current distribution can also be explained classically [1]. Up to now, the distinction between quantum and classical effects is still an open question in many implementations of Josephson junctions.

Based on this discussion, we present numerical simulations of the quantum mechanical and classical time evolution of such a system. In particular, we contrast the resulting switching current distributions.

[1] Grønbech-Jensen *et al.*, *Phys. Rev. Lett.* **95**, 067001 (2005).

TT 21.49 Mon 15:00 Poster B

SQUIDs for the readout of metallic magnetic calorimeters — •Anna Ferring, Mathias Wegner, Andreas Fleischmann, Loredana Gastaldo, Sebastian Kempf, and Christian Enss — Kirchhoff-Institute for Physics, Heidelberg University, Germany.

Superconducting quantum interference devices (SQUIDs) are the devices of choice to read out metallic magnetic calorimeters (MMCs). Here, the temperature change of the detector upon the absorption of an energetic particle is measured as a magnetization change of a paramagnetic temperature sensor that is situated in a weak magnetic field. Driven by the need for devices that allow for the readout of large-scale detector arrays with hundreds or even thousands of individual detectors as well as of single channel detectors with sub-eV energy resolution, we have recently started the development of low-T_c current-sensing SQUIDs. In particular, we are developing cryogenic frequency-domain multiplexers based on non-hysteretic rf-SQUIDs for detector array readout as well as dc-SQUIDs for single channel detector readout. We discuss our SQUID designs and the performance of prototype SQUIDs. We particularly focus on the frequency and temperature dependence of the SQUID noise as well as the reliability of our SQUID fabrication process for Nb/Al-AlO_x/Nb Josephson junctions. Additionally, we demonstrate experimentally that state-of-the-art MMCs can successfully be read out with our current devices. Finally, we discuss different strategies to improve the SQUID and detector performance aiming to reach sub-eV energy resolution for individual detectors as well as for detector arrays.

TT 21.50 Mon 15:00 Poster B

Metallic Magnetic Calorimeters for high resolution X-ray spectroscopy — •M. Krantz, D. Hengstler, J. Geist, C. Schötz, K. Hassel, S. Hendricks, M. Keller, S. Kempf, L. Gastaldo, A. Fleischmann, and C. Enss — KIP Heidelberg University.

We develop microfabricated, energy dispersive particle detector arrays based on metallic magnetic calorimeters (MMCs) for high resolution x-ray spectroscopy to challenge bound-state QED calculations. Our MMCs are operated at about T=30 mK and use a paramagnetic temperature sensor, read-out by a SQUID, to measure the energy deposited by single x-ray photons. We discuss the physics of MMCs, the detector performance and the cryogenic setups for two different detector arrays. We present their microfabrication layouts with focus on challenges like the heatsinking of each pixel of the detector and the overhanging absorbers. The maXs-20 detector is a linear 1x8-pixel array with excellent linearity in its designated energy range up to 20 keV and unsurpassed energy resolution of 1.6 eV for 6 keV x-rays. MaXs-20 operated in a highly portable pulse tube cooled ADR setup has already been used at the EBIT facilities of the MPI-K for new reference measurements of V-like and Ti-like tungsten. The maXs-30 detector currently in development is a 8x8-pixel 2d-array with an active detection area of 16 mm^2 and is designed to detect x-rays up to 50 keV with a designated energy resolution below 5 eV. MaXs-30 will be operated in a cryogen free 3He/4He-dilution refrigerator at the tip of a 40 cm long cold finger at $T = 20$ mK.

TT 21.51 Mon 15:00 Poster B

A large-area 4k-pixel detector for position and energy resolving detection of neutral molecular fragments — •D. Schulz[1], L. Gamer[1], A. Fleischmann[1], L. Gastaldo[1], S. Kempf[1], C. Krantz[2], O. Novotny[3], A. Wolf[2], and C. Enss[1] — [1]KIP Heidelberg University. — [2]MPI-K Heidelberg. — [3]Columbia Astrophysics Laboratory, New York, USA.

To investigate reactions like dissociative recombination in a laboratory environment, the Max Planck Institute for Nuclear Physics in Heidelberg is commissioning the Cryogenic Storage Ring to prepare molecular ions in their rotational and vibrational ground state. The full kinematics of these processes can be resolved by a position and energy sensitive detection of the produced neutral molecular fragments.

We present the design of a new large-area multi-pixel detector using metallic magnetic calorimeters for position and energy sensitive detection of massive particles with kinetic energies of up to a few hundred keV. The detector encompasses an array of 4096 quadratic absorbers, each with a side length of 700 μm, amounting to a total detection area of about 20 cm^2. Groups of four absorbers are thermally connected to one paramagnetic sensor, using different thermal links for pixel discrimination. A temperature change in the paramagnetic sensor leads to a change of magnetization in the sensor. Thanks to a novel readout scheme, all 4096 sensors can be read out using at total of 32 SQUIDs only.

TT 21.52 Mon 15:00 Poster B

Thermodynamical properties of Au:Ho dilute alloys for the ECHo collaboration — •Sebastian Haehnle — for the ECHo collaboration (http://www.kip.uni-heidelberg.de/echo/members), KIP Heidelberg University.

The absolute scale of the neutrino mass eigenstates is one of the puzzles in modern particle physics. One method to investigate the value of the electron neutrino mass is to analyse the high energy region of the ^{163}Ho electron capture spectrum. In the ECHo experiment low temperature metallic magnetic calorimeters are used for the calorimetric measurement of the EC spectrum of ^{163}Ho. To ensure 100% quantum efficiency the ^{163}Ho ions are implanted into the gold absorber. A detailed study of the thermodynamical properties of highly diluted Au:Ho is necessary to determine the detector response and to define the highest concentration possible for which the performance of the detectors is not reduced.

We determined Crystal-Field parameters for holmium in gold based on magnetization measurements from 2 K to 300 K, that would result in a non-Kramers doublet as groundstate with the first excited triplet state at 140 mK. We used numerical calculations for the combined Hamiltonian of the Crystal-Field and the Hyperfine interaction to predict a theoretical heat capacity at millikelvin temperatures. The results of the numerical calculation are compared to experimental results.

TT 21.53 Mon 15:00 Poster B

Microfabricated Thick Proximity Bi-layers as Sensors for Magnetic Penetration Thermometers (MPTs) — •J. Geist, D. Hengstler, M. Keller, M. Krantz, C. Schötz, S. Kempf, L. Gastaldo, A. Fleischmann, and C. Enss — Kirchhoff-Institute for Physics - Heidelberg University

Metallic magnetic calorimeters for high resolution x-ray spectroscopy use dilute paramagnetic alloys as temperature sensors operated at a temperature of 20 mK. Recent prototypes for soft x-rays achieved an energy resolution of 1.6 eV(FWHM) for 6 keV photons. To reach a similar resolution at higher and easy accessible temperatures, we are presently investigating superconducting sensor materials. Thereby the steep temperature dependence of the magnetic penetration depth is used in the superconducting transition as temperature information. A technically interesting class of materials might be proximity bi-layers consisting of a thick normal metal layer and a superconductor. This combination might allow to tune not only T_c, but also the transition width and therefore the dynamic range. We present first results of measurements were a thick gold and silver layer is deposited onto aluminum. The bi-layers are patterned to form meander-shaped coils, where the temperature dependence of the coil inductance was studied in inductance bridge circuits with SQUID readout. We present data for different structure sizes and discuss the resulting expected signal height and energy resolution.

TT 21.54 Mon 15:00 Poster B

Development of RF-SETs for error detection in semiconductor electron pumps — •David Reifert, Niels Ubbelohde, Ralf Dolata, Lukas Fricke, Thomas Weimann, and Alexander Zorin — Physikalisch-Technische Bundesanstalt (PTB), Bundesallee 100, 38116 Braunschweig. Germany

Semiconductor single electron pumps allow the transport of single electrons with a frequency f (about 1 GHz) which results in a current (I=e*f) in the range of about 0.1 nA. However, since the accuracy of these pumps (at present still worse than 1 ppm) is not sufficient for metrological applications, we developed a method to detect and account the errors of these pumps, which should lead to an improved accuracy. To realise this error detection we put several electron pumps in a serial circuit with intermediate charge islands between them. If one of the pumps operating simultaneously makes an error the charge on the island changes stepwise which can be detected by a sensitive charge detector. We use superconducting Al single electron transistors (SETs) as ultra-sensitive charge detectors which are capacitively coupled to the intermediate charge islands. In our previous experiments we operated the SETs in DC mode which allowed rather slow measurement bandwidth of a few kHz. To increase the measurement bandwidth of the SETs we put them in a resonant tank circuits and measure the reflectance of these resonators at corresponding frequencies. This tank circuit matches the high impedance of the SET (>100 kOhm) to a 50 Ohm line. We will show the general measurement setup and some first measurements of charge detection with such a RF-SET.