perpendicular to the applied field due to the flux line lattice, a longitudinal modulation is expected. In that case an additional broadening of a local probe spectrum should occur. The data clearly evidence the fielddriven change from second to first order transition at about 4.8T. On the other hand no additional line broadening is observed at very low temperatures below Tc in this orientation ($\hat{c} \parallel$ H), which disagrees with the assumption of the possible FFLO state.

[1] A. Bianchi,R. Movshovich,C. Capan,P.G. Pagliuso,and J. L. Sarrao, PRL, Vol.91, Number 18, 2003

TT 32.15 Thu 14:00 Poster B

Scanning Tunneling Spectroscopy studies on heavy fermion superconductors — •Stefan Ernst[1], Steffen Wirth[1], Hirale Jeevan[1], Christoph Geibel[1], Zachary Fisk[2], and Frank Steglich[1] — [1]Max Planck Institute for Chemical Physics of Solids, Dresden, Germany — [2]Department of Physics and Astronomy, UC Irvine

Scanning Tunneling Spectroscopy (STS) is a powerful tool for mapping the local electronic density of states of conducting sample surfaces. Of particular interest are experiments with superconducting (SC) materials, as information about the SC energy gap can directly be obtained. The application of STS to heavy fermion (HF) superconductors is expected to make a valuable contribution to the understanding of this class of materials. Fundamental properties such as the symmetry of the SC order parameter or, possibly, excitations due to the SC pairing interaction might be revealed.
This work reports on STM measurements carried out at low temperatures (320 mK) and under UHV conditions. A magnetic field of up to 12 T could be applied to confirm superconductivity of clean samples. For the materials investigated here, spectroscopic features in the order of a few hundred μeV are expected, calling for an excellent energy resolution during STS. The sufficiently high resolution of our STM has been verified by resolving the sub-meV SC energy gap of aluminum. Clean sample surfaces were prepared by *in situ* cleaving of the single crystals. Preliminary STS measurements were conducted on single crystalline samples of the HF superconductors $CeCoIn_5$ and $CeCu_2Si_2$.

TT 32.16 Thu 14:00 Poster B

Magnetic linear dichroism as new tool to determinecrystal fields in cubic Ce, Yb and Pr compounds — •Peter Koerner, Maurits Haverkort, Thomas Willers, Zhiwei Hu, Andrea Severing, and Liu Hao Tjeng — Institute of Physics II, University of Cologne

We have recently shown that polarization dependent soft-x-ray absorption spectroscopy (using linearly polarized light) is a powerful tool to probe the charge distribution of the crystal-field ground state of Ce Heavy-Fermion and Kondo intermetallics with tetragonal site symmetry [1]. The so-called linear dichroic signal at the Ce $M_{4,5}$ edges can be very large and is easily measured, thereby providing accurate quantitative information. For cubic systems, however, this dichroic effect vanishes. We now explore theoretically the feasibility to generate a dichroic signal by applying a strong magnetic field to the cubic system, thereby still using linearly polarized light. In this poster we will present under which conditions the lifting of the degeneracy by the Zeeman splitting will give rise to a detectable linear dichroic effect which can provide information about the charge distribution of the crystal-field ground state in cubic Ce, Yb compounds and the Pr skuterudites.. We note that this type of magnetic linear dichroism is different from that observed in e.g. Fe_2O_3 [2].

[1] P. Hansmann, A. Severing, Z. Hu, M.W. Haverkort, C.F. Chang, S. Klein, A. Tanaka, H.H. Hsieh, H.J. Lin, C.T. Chen, B. Fak, P. Lejay, L.H. Tjeng , Cond-Mat 0710.2778v1

[2] e.g. P. Kuiper et al., Phys. Rev. Lett. 70, 1549 (1993).

TT 32.17 Thu 14:00 Poster B

New correlated materials with phosphorus: A challenge for the crystal grower — •Anton Jesche, Cornelius Krellner, Nubia Caroca-Canales, Arpana Prasad, and Christoph Geibel — Max Planck Institute for Chemical Physics of Solids, Dresden, Germany

The f-shell of Ce, Eu, Yb, and U can adopt different configurations, magnetic or non-magnetic, depending on the chemical surrounding. In the past decades, a large variety of systems were intensively studied due to the occurrence of many unusual features, like e.g. the formation of heavy-fermions, of unconventional superconductivity, and of unconventional metallic and magnetic states. Most of these systems contain Al, Si, Ge, In, and Sn beside the f-element and transition metals (T). On the way to look for new correlated materials, we have started the synthesis of several P-containing compounds. The crystal growth is rather challenging because of the high reactivity of elemental P. We succeeded in preparing CeTPO, CeT_2P_2, and $EuNi_2P_2$ using a Sn-flux method. For the CeTPO, CeT_2P_2 series the chemical structures are already known; however, no physical properties were reported. In this contribution we will present the details of the synthesis and discuss the physical properties determined by means of magnetic susceptibility, specific heat, and electrical resistivity measurements.

TT 32.18 Thu 14:00 Poster B

Preparation of $Sr_{1-x}Ca_xRuO_3$ thin films — •Melanie Schneider, Vasile Mosneaga, and Philipp Gegenwart — I. Physik. Institut, Georg-August Universitaet Goettingen, Friedrich-Hund Platz 1, 37077 Goettingen

The series $Sr_{1-x}Ca_xRuO_3$ displays a continuous evolution from itinerant electron magnetism with $T_c = 160$ K ($x = 0$) towards a paramagnetic metallic state at $x = 1$. Previous studies on polycrystalline bulk samples raise the question whether the series shows a quantum critical point [1] or phase separation near $x = 0.7$ [2].
Here, we report first results on thin films which have been grown epitaxially on $SrTiO_3$ substrates by the metalorganic aerosol deposition technique. This technique is based on the use of a solution containing acetylacetonates of Sr^{2+}, Ca^{2+} and Ru^{3+}. Growth conditions have been optimized by the variation of the ($Sr_{1-x}Ca_x$) to Ru ratio, deposition rate, molarity of the solution and deposition temperature. X-ray diffraction as well as STM, electrical resistivity and magnetization measurements are reported.

[1] K. Yoshimura *et al.*, *Phys. Rev. Lett.* **83**, 4397 (1999).
[2] Y.J. Uemura *et al.*, *Nature Physics* **3**, 29 (2007).

TT 32.19 Thu 14:00 Poster B

Structural studies on transition metal oxides with only one or two electrons in the 3d shell — •A. C. Komarek[1], T. Möller[1], M. Isobe[2], M. Gottschlich[1], M. Meven[3], M. Hölzel[3,4], A. Senyshyn[3,4], W. Morgenroth[5], D. Trots[5,4], M. Grüninger[1], and M. Braden[1] — [1]Institute of Physics II, University of Cologne — [2]Institute for Solid State Physics, The University of Tokyo — [3]TU Munich, FRM-II, Garching — [4]Institute for Materials Science, TU Darmstadt, Darmstadt — [5]Hasylab/DESY, Hamburg

Transition metal oxides with only one or two electrons in the 3d-shell are particularly interesting, as diffraction may more easily isolate the impact of the active electrons. A) The vanadate AV_2O_5 shows a variety of low-dimensional phenomena. We confirm the persistence of charge ordering of LiV_2O_5 down to 2 K by single crystal neutron diffraction and present an electron density study. B) We were able to solve the complex, distorted tetragonal hollandite ($K_2V_8O_{16}$) structure below the MI-transition at 175 K revealing a dimerization of the vanadium ions in one of two vanadium chains and a zig-zag-chain formation in the neighbouring chain. C) $CaCrO_3$ is a d^2 system with the unusual Cr oxidation state 4^+. It appears to be a bad metal, as found in optical spectroscopy, but in contrast to most metallic transition metal oxides $CaCrO_3$ orders antiferromagnetically with a pronounced structural anomaly occuring just at the Néel temperature. D) Cubic spinels AM_2O_4 with magnetic M ions have attracted strong attention due to intrinsic frustration. We determined the electron density of ZnV_2O_4.

TT 32.20 Thu 14:00 Poster B

Magnetic order of $CeNi_xGa_{4-x}$ — •Veronika Fritsch[1] and Hilbert v. Löhneysen[1,2] — [1]Physikalisches Institut, Universität Karlsruhe, 76128 Karlsruhe, Germany — [2]Institut für Festkörperphysik, Forschungszentrum Karlsruhe, 76021 Karlsruhe, Germany

We investigate the ternary Ce-Ni-Ga system with samples prepared by flux-growth method in Ga-flux. The series $CeNi_xGa_{1-x}$ crystallizes in the tetragonal $BaAl_4$-structure. The homogeneity range of this structure is restricted to a narrow region around $x = 1$. The Ga-rich compounds have previously been reported to exhibit ferromagnetism [1]. Our systematic study shows that with increasing Ni content the lattice parameters shrink. However, they do not obey Vegard's law. The magnetic transition temperature, as identified from the sharp maximum in the magnetic susceptibility, increases slightly with increasing Ni content. On the other hand the absolute value of the magnetization at the transition drops around one order of magnitude. We did not find any difference between field-cooled and zero-field cooled magnetization measurements nor a hysteresis in the magnetization versus field curves. This leads us to the conclusion that our samples order antiferromagnetically.

[1] E. V. Sampathkumaran et al., Phys. Rev. B **47**(13), 8349, (1993).

TT 32.21 Thu 14:00 Poster B

Uniaxial pressure and strain dependences of the characteristic energies in $CeCu_{6-x}Au_x$ — •Kai Grube[1], Stefanie Drobnik[1,2], Roland Schäfer[1], Frédéric Hardy[1], Christoph Meingast[1], Oliver Stockert[3], and Hilbert von Löhneysen[1,2] — [1]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, 76021 Karlsruhe, Germany — [2]Physikalisches Institut, Universität Karlsruhe, 76128 Karlsruhe, Germany — [3]MPI für chemische Physik fester Stoffe, 01187 Dresden, Germany

If paramagnetic compounds are driven into a magnetically ordered state by a nonthermal control parameter, the spontaneous symmetry breaking in the ordered state, as well as the interplay of characteristic energies inevitably lead to a change of the anisotropy of the compound at low temperatures. This can be used to identify the dominant energy scales and to study in more detail continuous phase transitions at zero temperature, i.e. so-called quantum critical points (QCP). The archetypical heavy-fermion system $CeCu_{6-x}Au_x$ is one of the best investigated examples of a magnetic QCP. It can easily be tuned across the onset of antiferromagnetic order by changing its volume either by alloying with Au or applying pressure. For several distinct Au contents we have determined the uniaxial pressure and strain dependences of the Kondo and the magnetic interaction energies, with the Grüneisen parameter obtained through thermal expansion, specific heat, and compressibility measurements. The results show a strongly anisotropic antiferromagnetic phase which develops from a nearly isotropic Kondo-lattice state.

TT 32.22 Thu 14:00 Poster B

High-pressure magnetization measurements on single-crystalline CoS_2 — •Sandra Drotziger[1], Kai Grube[2], Marc Uhlarz[1], Christian Pfleiderer[3], John Wilson[4], and Hilbert von Löhneysen[1,2] — [1]Physikalisches Institut, Universität Karlsruhe, 76128 Karlsruhe — [2]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, 76021 Karlsruhe — [3]Physik Department E21, Technische Universität München, 85748 Garching — [4]H.H. Wills Physics Laboratory, University of Bristol, UK

Suppression of magnetic order in weak itinerant magnets has recently attracted scientific interest due to novel phases emerging in the vicinity of a quantum phase transition. Among these systems, the pyrite compound CoS_2 is a promising candidate for general considerations as it has a simple cubic structure with high magnetic isotropy. At $T_C \approx 122\,K$ CoS_2 develops ferromagnetic order with a spontaneous moment of $\mu_s = 0.84\,\mu_B$/Co. With increasing pressure the ferromagnetism is suppressed to lower temperatures and the order of the phase transition changes from second to first order at the tricritical point $p^* \approx 0.1\,GPa$ [1]. For $p > p^*$ a first order field-induced phase transition is observed. We report pressure studies of the DC magnetization measurements on CoS_2 single crystals as a function of temperature down to 2.3 K and magnetic field up to 12 T. The measurements were performed in a miniaturized diamond anvil cell made of a non-magnetic CuBe alloy. The temperature of the metamagnetic transition increases linearly, with a slope almost independent of p.

[1] S. Barakat, PhD Thesis, University of Cambridge (2001).

TT 32.23 Thu 14:00 Poster B

$CeRu_2Si_2$ and Quantum Critical Metamagnetism? — •Franziska Weickert[1,2], Philipp Gegenwart[3,1], Markus Garst[4], and Frank Steglich[1] — [1]Max-Planck-Institut für Chemische Physik fester Stoffe, 01187 Dresden — [2]Hochfeld-Magnetlabor Dresden, 01328 Dresden — [3]I. Physikalisches Institut, Universität Göttingen, 37077 Göttingen — [4]Institut für Theoretische Physik, Universität Köln, 50938 Köln

$CeRu_2Si_2$ is a well-known prototypical heavy fermion system and shows a sudden strong increase in the magnetization M and the sample length ΔL for magnetic fields parallel to the crystallographic c-direction at around 7.8 T. These anomalies occur below 4 K and sharpen with decreasing temperatures, but no features for a first order phase transition are observed down to 15 mK.

We report new thermal expansion α, magnetostriction λ and specific heat C/T measurements, which have been made in mT magnetic field steps around the metamagnetic crossover down to 15 mK on very pure single crystals.

The results show hints for the existence of a quantum critical endpoint in $CeRu_2Si_2$ and were compared with an extended model of metamagnetic quantum criticality, which was first introduced by *Millis et al.* in 2002.

TT 32.24 Thu 14:00 Poster B

Development of the magnetic order in $Yb(Rh_{1-x}Co_x)_2Si_2$ — •Christoph Klingner, Cornelius Krellner, Tanja Westerkamp, Niels Oeschler, Manuel Brando, Christoph Geibel, and Frank Steglich — Max Planck Institute for Chemical Physics of Solids, D-01187 Dresden, Germany

In recent years $YbRh_2Si_2$ has been intensively investigated due to its proximity to an antiferromagnetic quantum critical point (QCP). As expected for Yb-Kondo lattice compounds the magnetic ordering of $YbRh_2Si_2$ (T_N=70mK) can be shifted to higher temperature by applying pressure. Doping with Cobalt results in positive chemical pressure, allowing therefore the investigation of the magnetic phase diagram and the behavior while stabilizing the antiferromagnetic ordered state. The advantage of less complex measurements compared to high pressure experiments leads to more detailed and precise results than in pressure studies. In this contribution we report on the growth of a series of single crystals $Yb(Rh_{1-x}Co_x)_2Si_2$ with concentrations x between 0 and 1. The low temperature properties studied by resistivity, specific heat and magnetization measurements for different concentrations will be presented. Further on the behaviour of the transitions under an applied magnetic field will be discussed. Finally, a phase diagram of $Yb(Rh_{1-x}Co_x)_2Si_2$ will be presented and compared with the pressure phase diagram of $YbRh_2Si_2$.

TT 32.25 Thu 14:00 Poster B

Thermodynamics of Spin-Ladder and Spin-Chain Systems close to Quantum Criticality — •J. Rohrkamp[1], T. Lorenz[1], A. V. Sologubenko[1], O. Heyer[1], M. Garst[2], F. Anfuso[2], A. Rosch[2], K. Krämer[3], and M. M. Turnbull[4] — [1]II. Physikalisches Institut, Universität zu Köln — [2]Institut für Theoretische Physik, Universität zu Köln — [3]Department of Chemistry and Biochemistry, University of Bern — [4]Carlson School of Chemistry and Department of Physics, Clark University

Compounds with magnetic subsystems representing simple model spin systems with weak magnetic coupling constants are ideal candidates to test theoretical predictions for the generic behavior close to quantum phase transitions. We present measurements of the thermal expansion, magnetostriction and thermal conductivity of the spin-$\frac{1}{2}$-ladder system piperidinium copper bromide $(C_5H_{12}N)_2CuBr_4$ and the spin-$\frac{1}{2}$-chain compound copper pyrazine dinitrate $Cu(C_4H_4N_2)(NO_3)_2$. Both compounds show quantum phase transitions as a function of magnetic field with pressure dependent critical fields. The low-temperature thermal expansion approaches $1/\sqrt{T}$ divergences at the critical fields and shows a complex behavior with various sign changes inbetween.

TT 32.26 Thu 14:00 Poster B

Search for coupled S=1/2 dimer systems in a new class of nitronyl nitroxides biradicals — •K. Remović-Langer1[1], U. Tutsch[1], C. T. Pham[1], M. Baumgarten[2], E. A. Mostovich[2], B. Wolf[1], and M. Lang[1] — [1]Physikalisches Institut, J.W. Goethe-Universität, Max-von-Laue-Str. 1, SFB/TR 49, D-60438 Frankfurt(M), Germany — [2]Max-Planck-Institut für Polymerforschung, Ackermannweg 10, SFB/TR 49, D-55128 Mainz, Germany

Recently, quantum magnets such as coupled-dimer systems and easy-plane antiferromagnets have emerged as interesting objects for studying the properties of magnetic field-induced Bose-Einstein condensation (BEC). Up until the present day, most of the studies have been focused on the magnetic field-induced BEC. Some recent experiments, however, give evidence for a transition which could be interpreted as pressure-induced BEC. So far, TlCuCl3, is the only quantum magnet on which field- and pressure-induced transitions have been studied. Biradical-based coupled-dimer systems, yielding moderate intradimer and tunable dimer-dimer interactions, are promising target materials for studying the properties of those field- and pressure-induced quantum phase transitions. We report here on the results of magnetic measurement on a group of metal-organic nitronyl nitroxides dimer systems which are proving to be a promising class of material for realization of systems to study field- and pressure-induced quantum phase transitions and their critical phenomena.

TT 32.27 Thu 14:00 Poster B

Structural and magnetic properties of a betaine-bridged trimer Cu^{2+} spin system — •K. Remović-Langer[1], B. Wolf[1], L. Wiehl[2], E. Haussühl[2], B. Winkler[2], N. Hasselmann[3], F. Sauli[3],