state — •S. Yasin[1,2], B. Salameh[2], M. Dumm[2], and M. Dressel[2] — [1]Institut Hochfeld-Magnetlabor Dresden, Forschungszentrum Dresden-Rossendorf, D-01314 Dresden, Germany — [2]1. Physikalisches Institut, Universität Stuttgart, 70550 Stuttgart, Germany

We studied the charge ordered (CO) state of the quasi 1-D $S = 1/2$ quantum spin chains $(TMTTF)_2X$ (X=SbF_6 and AsF_6) by comprehensive W-Band (95 GHz), Q-band (34 GHz) and X-Band (9.5 GHz) ESR experiments between 4 and 300 K in order to explore the nature of the exchange interaction in the CO state. At high temperatures, both compounds show a linear decrease of the linewidth with decreasing temperature; this behavior does not depend on the applied microwave frequency as well as the anisotropy of both, linewidth and g-value. Below T_{CO}, the breaking of the inversion symmetry of the $(TMTTF)_2$-dimers results in additional contributions ΔH_{CO} to the ESR linewidth. While the linewidth is frequency independent along the three principle magnetic axes a, b', and $c*$, it is substantially enhanced for the Q- and W-band measurements along the diagonal of $a - b'$ plane. The enhanced linewidth along 45^o in the $a - b'$ plane below T_{CO} shows a quadratic frequency dependence which is characteristic for anisotropic Zeeman interaction. From this finding we can conclude that the charge order leads to two inequivalent magnetic sites. We will compare this result to one obtained on anion-ordered TMTTF salts where a different charge-order pattern was proposed.

TT 6.31 Mon 13:00 P1A

Quantum-Phase-Transition within Density Functional Theory using exact Exchange-Correlation Potentials — •Martin Moch[1] and Peter Schmitteckert[1,2] — [1]Institut für Theorie der Kondensierten Materie, Universität Karlsruhe, D-76021 Karlsruhe, Germany — [2]Institut für Nanotechnologie, Forschungszentrum Karlsruhe, D-76021 Karlsruhe, Germany

Density Functional Theory (DFT) is one of the most widely used numerical tools to study properties of interacting Fermi systems. In our work we consider the question whether DFT is able to describe the quantum phase transitions based on the interplay of disorder and interaction. To this end we calculate exact Kohn-Sham potentials for disordered, interacting, half-filled, one-dimensional Fermi systems from the local densities obtained from the Density Matrix Renormalization Group (DMRG) calculations. In the framework of Anderson localization one-dimensional systems are always localized. However, for attractive interaction the real system undergoes a phase transition to a metallic phase at a finite interaction. Here we report on the manifestation of this phase transition in the effective non-interacting DFT description.

TT 6.32 Mon 13:00 P1A

Comparison of dynamics in quantum impurity models with bosonic and fermionic baths — •David Roosen[1], Karyn Le Hur[2], and Walter Hofstetter[1] — [1]Institut für Theoretische Physik, Goethe-Universität, 60438 Frankfurt/Main, Germany — [2]Department of Physics, Yale University, New Haven, CT 06520, USA

Equivalence relations between quantum impurity models with bosonic and fermionic baths can be derived using the bosonization technique [1]. We focused on the well-known mapping between the anisotropic Kondo and the spin boson model (for a recent review on this model see [2]) and investigated, to which degree this equivalence holds for general local observables, and whether it extends to nonequilibrium dynamics.

The dynamics of the two models are investigated using a time-dependent Numerical Renormalization Group (NRG) algorithm [3] developed recently. A detailed study of the time-dependent entanglement entropy, a measure of increasing importance due to its prominent role in numerous fields of physics ranging from quantum information science to quantum phase transitions in condensed matter systems [4], has been carried out.

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TT 6.33 Mon 13:00 P1A

Dynamical correlation functions in the Ising model with a boundary — •Dirk Schuricht and Fabian H. L. Essler — The Rudolf Peierls Centre for Theoretical Physics, University of Oxford, United Kingdom

Using scanning tunneling microscopy one can measure the local density of states in the vicinity of impurities. In one-dimensional systems, like stripes in high-temperature superconductors or carbon nanotubes, an impurity is equivalent to a boundary. This motivates the study of correlation functions in models with boundaries. In particular, the low-energy properties of strongly correlated systems are typically described by boundary field theories. We have calculated the dynamical correlation functions in the semi-infinite quantum Ising chain in the presence of a boundary magnetic field [1]. The used form-factor expansion is found to be fastly convergent for $M|R| > 0.1$, where R is the distance from the boundary and $1/M$ the correlation length. At sufficiently late times we observe oscillatory behaviour of the correlations arbitrarily far away from the boundary. We investigate the effects of the boundary bound state that is present for a range of boundary magnetic fields.

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TT 6.34 Mon 13:00 P1A

Quantum Monte Carlo results on phonon softening in the two-dimensional Holstein model — •Prabuddha Chakraborty[1,2], Richard Scalettar[2], and Warren Pickett[2] — [1]Theoretical Physics III, Center for Electronic Correlations and Magnetism, Institute of Physics, University of Augsburg, D-86135 Augsburg, Germany — [2]University of California, Davis, CA 95616, USA

In this poster, we present new observations on the phonon spectral density in the two dimensional Holstein model. The numerical method we use is Determinant quantum Monte Carlo, combined with Maximum Entropy which is used to extract the real frequency spectral density of the phonons. We highlight one of our most surprising observations: the presence of a ubiquitous softening of the phonon at the center of the Brillouin zone, in direct contradiction to established results in this problem. We summarize the behaviour of the softening across a wide range of electron densities, phonon frequencies and electron-phonon interaction strengths.

TT 6.35 Mon 13:00 P1A

Huge thermomagnetic and thermoelectric effects in Luttinger liquids and spin chains — •David Rasch[1], Arti Garg[2], Achim Rosch[1], and Efrat Shimshoni[3] — [1]University of Cologne, Germany — [2]Technion, Haifa, Israel — [3]Bar-Ilan University, Ramat-Gan, Israel

The interplay of Umklapp scattering and weak disorder in Luttinger liquids and spin chains leads to strong effects in the field and doping dependence of transport quantities. We show that the thermal conductivity of spin chains as a function of a magnetic field B displays a pronounced dip for $B \sim T$. In metallic systems, we predict large violations of the Wiedemann Franz law. Depending on the doping, the Wiedemann Franz ratio $\kappa/(\sigma T)$ can become either very large or very small.

TT 6.36 Mon 13:00 P1A

Quantum dots coupled to Luttinger liquid leads - conductance and charging — •Peter Wächter[1], Volker Meden[2], and Kurt Schönhammer[1] — [1]Institut für Theoretische Physik, Universität Göttingen, D-37077 Göttingen — [2]Institut für Theoretische Physik A, RWTH Aachen, D-52056 Aachen

The theoretical description and experimental realization of quantum dots is a very active field in condensed matter physics. In our work, we model quantum dots as non-degenerate energy levels coupled to Luttinger liquid leads, i.e. we couple the zero-dimensional dot to leads of dimension one in order to study how the Luttinger liquid physics in the leads affects the physics of the dot. In particular we identify universal power law scaling in the charging of a single quantum dot and comment on the conductance through such a system. Furthermore we explore the conductance through parallel quantum dots coupled to Luttinger liquid leads.

TT 6.37 Mon 13:00 P1A

Optical signatures of Kondo effect in quantum dots — Hakan E. Türeci[1], Atac Imamoglu[1], Andreas Weichselbaum[2], •Markus Hanl[2], Theresa Hecht[2], and Jan von Delft[2] — [1]Institute of Quantum Electronics, ETH-Zürich, CH-8093 Zürich, Switzerland — [2]Arnold Sommerfeld Center for Theoretical Physics, LMU München, D-80333 München, Germany

We analyze the optical signatures of many body interactions between an optically excited QD electron and an adjacent fermionic reservoir.