Poster Abstract (mini session)

Nov.8 | Nov.15

Mini Poster Session (Nov.8, 15:30-17:30)

mPSA-1: **Matsueda, Hiroaki**

- Affiliation: Sendai National College of Technology, Japan
- Title: **"Dynamics of photoinduced states in strongly correlated electron systems"**
- Abstract:

  Motivated by photoinduced phase transitions in strongly correlated electron systems, we examine charge and spin dynamics induced by photoirradiation. We calculate the transient optical absorption spectra of the V-t, Hubbard, and double-exchange models by the DMRG method. We examine the role of spin degrees of freedom on the transition, difference between chemical and photo-doping, and dependence of excitation power on the transition. We address the effect of the spin-charge separation on the transition in 1D

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mPSA-2: **Okumura, Masahiko**

- Affiliation: Center for Computational Science and e-Systems, Japan Atomic Energy Agency and CREST (JST), Japan
- Title: **"Hole Localization in Doped Anderson-Hubbard Model?? DMRG Studies for 1-D and n-leg ladder models"**
- Abstract:

  In low-dimensional systems of electrons in solids, it is well-known that strong on-site repulsion as well as disorder can make the systems insulators. However, when the both coexist, the interplay between them has been not fully clarified yet, because it is difficult to take into account both strong disorder and interaction in theoretical calculations. Moreover, analytical treatments become further hopeless as holes are slightly doped into the half-filling regime. Therefore, we studied the one dimensional Anderson-Hubbard model in various hole doping ranges (with a special attention on the low-doping range) by using density matrix renormalization group (DMRG) in order to evaluate effects of strong disorder and interaction in an exact manner. Consequently, we found that both effects cooperatively give rise to a spatial separation between the hole localized and the Mott "phases" in the low doped range. We would like to point out that such a separation behavior is never attained by the present theoretical treatments. In this paper, we present an outline by DMRG for the on-site repulsion (U/t) vs. randomness diagram, in which two different characters for localization compete. Furthermore, we suggest that a cold atom in the presence of the optical lattice is a good candidate to systematically confirm the present results.

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mPSA-3: **Tezuka, Masaki**

- Affiliation: Tokyo Institute of Technology, Japan
- Title: **"Phase diagram for the one-dimensional Hubbard-Holstein model obtained with the density-matrix renormalization group"**
- Abstract:

  We have obtained the phase diagram of the Hubbard-Holstein model in the coexistence of electron-electron and electron-phonon interactions for one-dimensional systems. Here, the density-matrix renormalization group (DMRG) method with an improved warm-up (the recursive sweep) procedure has enabled us to calculate various correlation functions. We have examined the cases of (i) the systems half-filled by electrons for the full parameter space spanned by the electron-electron and electron-phonon coupling constants and the phonon frequency, (ii) non-half-filled system, and (iii) trestle lattice. For (i), we have detected a region where both the charge and on-site pairing correlations decay with power-laws in real space, which suggests a metallic behavior. While pairing correlations are not dominant in (i), we have found that become dominant as the system is doped in (ii) or as the electronic band structure is modified (with a broken electron-hole symmetry) in (iii) in certain parameter regions

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mPSA-4: **Schneider, Imke**

- Affiliation: University of Kaiserslautern, Germany
- Title: **"Local density of states of a finite quantum wire with momentum dependent interaction parameter"**
- Abstract:

  We consider the bosonization of a finite quantum wire with longer range interactions. The Luttinger Liquid parameter must be taken as an effective function of momentum and the electron distribution in

individual states can then be analyzed with help of a recursive formula. The velocity of the bosonic excitations becomes momentum dependent for longer range interactions. Energy levels split and bosonic excitations, which are degenerate for a constant Luttinger Liquid parameter, do not add coherently anymore. We present results for different momentum dependencies of the scattering amplitudes.
Additionally, we discuss the spatial structure and the energy dependence of the local density of states of a finite wire confined to open boundary conditions. The degenerate bosonic wave functions, which contribute to the local density of states at a given energy level, are analyzed in detail. Quantitative predictions for the local density of states and STM experiments can be made. In the limiting cases the asymptotic power laws are recovered. We compare the calculations with DMRG simulations of the spin 1/2 Heisenberg chain.

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mPSA-5: **Shiroishi, Masahiro**

- Affiliation: Institute for Solid State Physics, University of Tokyo, Japan
- Title: **"String correlation function for spin-1/2 XXZ chain and its application "**
- Abstract:

  String correlation function is one of the fundamental non-local correlation functions, which has been used and studied in various contexts of low dimensional quantum spin systems. Recently we have obtained its exact
  asymptotic formula for the critical phase of the spin-1/2 XXZ chain [1]. Here we shall report its remarkable application, proposed by Abraham et al [2], to the evaluation of an effective attractive force for the van Beijeren's BCSOS model

  [1] M. Bortz, J. Sato and M. Shiroishi, J. Phys. A: Math. Theor. 40 (2007) 4253.
  [2] D. B. Abraham, F. H. Essler, and A. Macio?ek: Phys. Rev. Lett. 98, (2007) 170602

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mPSA-6: **Hirano, Takaaki**

- Affiliation: Department of Applied Physics, The University of Tokyo, Japan
- Title: **"A local order parameter of the generic VBS states"**
- Abstract:

  Recently, the phases which can not be characterized by the classical order parameter have been found in many systems. One of the ideas to characterize them is to distinguish such phases by non classical order parameters which is called topological order. We show that the topological phases in the quantum spin systems which have been thought to have only the non-local type of the order parameter can be characterized by a local order parameter defined by the Berry phase. The Berry phase is quantized to 0 or π and topologically stable against small perturbations as long as the gap remains finite and the ground state is invariant under some anti- unitary transformation. The topological phases of gapped spin chains are classified by the texture pattern of the Berry phase defined on the local link [1]. We analytically study this Berry phase for the Affleck-Kennedy-Lieb-Tasaki model [2].
  [1] Y. Hatsugai, J.Phys. Soc. Jpn. 74 1374 (2005);75 123601 (2006).
  [2] I. Affleck, T. Kennedy, E. H. Lieb, and H. Tasaki, Phys. Rev. Lett. 59, 899 (1987).

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mPSA-7: **Katsura, Hosho**

- Affiliation: Department of applied physics, University of Tokyo, Japan
- Title: **"Entanglement Entropy and Fractional Exclusion Statistics"**
- Abstract:

  We study the entanglement between two subsets of particles in the ground state of the Calogero-Sutherland model. Using the duality relations of the Jack symmetric polynomials, exact expressions for both the reduced density matrix and the entanglement entropy are obtained in the limit of an infinite number of particles traced out. We estimate an upper bound of the entanglement entropy and interpret it in terms of fractional exclusion statistics.
  [1] H. Katsura and Y. Hatsuda, arXiv:0708.1207(2007)

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Mini Poster Session (Nov.15, 15:30-17:30)

mPSB-1: **Arikawa, Mitsuhiro**

- Affiliation: University of Tsukuba, Japan
- Title: **"Local topologigal order parameter on quantum spin-Hall phase"**
- Abstract:

  We consider the Kane-Mele model on honeycomb lattice [1]. In this system, there exists a spin-Hall phase, which shows Z_2 order with the gapless mode in the edge state but not in the bulk. So far, the

spin-Chern number has been considered by twist of the boundary condition to understand the spin-Hall phase[2, 3]. In this work, we discuss the properties on this phase by means of the local quantum topologigal order parameter[4].

[1] C.L.Kane and E.J.Mele, Phys. Rev. Lett. 95 (2005) 146802.
[2] D.N.Sheng, Z.Y.Weng, L.Sheng and F.D.M.Haldane, Phys. Rev. Lett. 97 (2006) 036808.
[3] T.Fukui and Y.Hatsugai, Phys. Rev. B 75 (2007) 121403.
[4]Y.Hatsugai, J. Phys. Soc. Jpn 75 (2006) 123601.

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mPSB-2: **Nakamura, Masaaki**

- Affiliation: Department of Applied Physics, Faculty of Science, Tokyo University of Science, Japan
- Title: **"Orbital Magnetism and Transport Phenomena in Multilayer Graphene"**
- Abstract:

We discuss the orbital magnetism and the Hall effect in the multilayer graphene. First we derive the effective Hamiltonian of the few layer graphene with Bernal stacking. Next, we consider the layer-number dependence of the magnetic susceptibility and the Hall conductivity of the multilayer graphene with orthorhombic and Bernal stacking.

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mPSB-3: **Nagaya, Kiyonobu**

- Affiliation: Depertment of Physics, Graduate School of Science, Kyoto University, Japan
- Title: **"Site-dependent charge localization in free rare-gas clusters"**
- Abstract:

Recently, We have carried out the electron - ion - cooncidence (EICO) measurements and multi-hit momentum imaging (MHMI) measurements of free rare-gas clusters by using hard x-ray excitation.

EICO spectra have been measured as a function of cluster size.
EICO spectra reveal that strong fragmentation occur after the hard-xray excitation of clusters.
Analysis of branching ratio of daughter ions suggests the site dependent charge localization for krypton clusters.

MHMI measurements are applied for krypton clusters with an average size of 160. The authors have sorted MHMI results by the number of coincidence ion signals (N_coin). The momentum of daughter ions have been evaluated from MHMI measurements. The N_coin dependence of momentum suggests that the heavier ions are produced in the central part of clusters and vice versa. The results of MHMI are fully consistent with site-dependent charge localization model suggested from EICO.

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