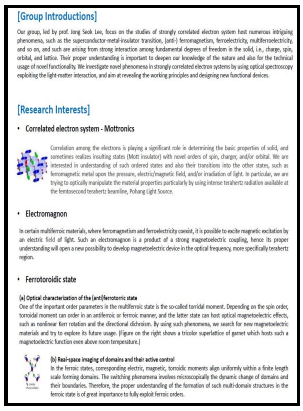
Condensed matter physics - dynamic correlations

Benjamin/Cummings - The Joynt Group


[Group Introductions]

Our group, led by prof. Jung Seok Lee, focus on the studies of strongly correlated electron system host numerous intriguing phenomena, such as the superconductor-metal-insulator transition, (anti-) ferromagnetism, ferroelectricity, multiferroelectricity, and so on, and such are arising from strong interaction among fundamental degrees of freedom in the solid, i.e., charge, spin, orbital, and lattice. Their proper understanding is important to deepen our knowledge of the nature and also for the technical usage of novel functionality. We investigate novel phenomena in strongly correlated electron systems by using optical spectroscopy exploiting the light-matter interaction, and aim at revealing the working principles and designing new functional devices.

[Research Interests]

- Correlated electron system - Mottronics

Correlation among the electrons is playing a significant role in determining the basic properties of solid, and sometimes realizes insulting states (Mott insulator) with novel orders of spin, charge, and/or orbital. We are interested in understanding of such ordered states and also their transitions into the other states, such as ferromagnetic metal upon the pressure, electric/magnetic field, and/or irradiation of light. In particular, we are trying to optically manipulate the material properties particularly by using intense terahertz radiation available at the femtosecond terahertz beamline, Pohang Light Source.

- Electromagnon

In certain multiferroic materials, where ferromagnetism and ferroelectricity coexist, it is possible to excite magnetic excitation by an electric field of light. Such an electromagnon is a product of a strong magnetoelectric coupling, hence its proper understanding will opens a new possibility to develop magnetoelectric device in the optical frequency, more specifically terahertz region.

- Ferrotoroidic state

(a) Optical characterization of the (anti)ferrotoroic state

One of the important order parameters in the multiferroic state is the so-called toroidal moment. Depending on the spin order, toroidal moment can order in an antiferroic or ferroic manner, and the latter state can host optical magnetoelectric effects, such as nonlinear Kerr rotation and the directional dichroism. By using such phenomena, we search for new magnetoelectric materials and try to explore its future usage. (Figure on the right shows a tricolor superlattice of garnet which hosts such a magnetoelectric function even above room temperature.)

(b) Real-space imaging of domains and their active control

In the ferroic states, corresponding electric, magnetic, toroidic moments align uniformly within a finite length scale forming domains. The switching phenomena involves microscopically the dynamic change of domains and their boundaries. Therefore, the proper understanding of the formation of such multi-domain structures in the ferroic state is of great importance to fully exploit ferroic orders.

Description: -
-
Materials management.
Machine design.
Marine turbines.
Balancing of machinery.
Statistical physics.
Condensed matter.Condensed matter physics - dynamic correlations
-Condensed matter physics - dynamic correlations
Notes: Includes bibliographies and index.
This edition was published in 1986

Tags: #Dynamic #structure #factor

Condensed concepts: Static versus dynamic correlations in quantum chemistry

The corrections to this are dynamical correlations. Finite-size effects can be estimated by comparing data for various clusters shown in Appendix. Information about registration may be found.

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In condensed matter theory, some recent projects have included discrete scale invariance in topological materials and optical properties of unconventional superconductors. It appears that heat flow is not diffusive but instead super-diffusive which means that the thermal conductivity of low-dimensional materials is infinite. The only alternative tool is resonant inelastic x-ray scattering RIXS , however, this approach does not offer sufficient energy resolution to compare observations with theory.

Dynamic structure factor

Such measurements typically rely on a technique called inelastic neutron scattering, however, iridium compounds such as Na 2 IrO 3 absorb neutrons instead of scattering them. If I am reviewing a copy of a book and I have received a complimentary copy from the publisher I will state that in the review.

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We appreciate your continued effort and commitment to helping advance science, and allowing us to publish the best physics journals in the world. The theoretical spectra are broadened by the experimental resolution function of the high-resolution setup.

Condensed concepts: Static versus dynamic correlations in quantum chemistry

At high temperature, short-range dynamics, possibly connected to a proximate QSL, emerges.

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Experimentally, it can be accessed most directly by or.

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