

Dimensionality, electronic correlation, and low-temperature phases in condensed molecular materials: selected topics from recent progress

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In condensed molecular materials (CM2), complexity of molecular structure eventually leads to rather universal low-temperature phases, such as superconductivity, magnetism, or ferroelectricity. First, I will give pedagogical lecture on how to materialize an idea of “hierarchical structure of physical (many-body) processes.” I’ll emphasize interplay of dimensionality, electronic correlation, and quantum/thermal fluctuations in strongly correlated low-dimensional electron systems. The concept of renormalization-group and universality is quite useful there. Then, based on the theoretical background, I will take up some topics from recent progress in this (my own) field.

Part I.

1. Boltzman transport, localization, and tunneling in low-dimensional systems
2. How to use renormalization group in dimensional crossover problems
3. Strong coupling fixed point and “frozen correlation” in Q1D systems
 - 3.1 SDW phase transition from incoherent metallic phases in TM salts
 - 3.2 Hidden magnetism and Anderson localization in DCNQI salts
 - 3.3 Superconductivity in ladder

Part II.

4. Multicomponent order parameters and multicritical phenomena in Q1D mixed-stack charge-transfer (CT) complex TTF-CA
5. Nobel magnetism and optical response in organic magnet: chiral order in cyano-bridged complex

Ref.

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- [2] J. Kishine, T. Luty, and K. Yonemitsu, “*Ferroelectric phase transition, ionicity condensation, and multicriticality in charge transfer organic complexes,*” cond-mat/0307731.

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