

1 Aoki Group

Subject: Theoretical condensed-matter physics

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Our main interests are many-body and topological effects in electron and cold-atom systems, i.e., **superconductivity, magnetism and topological phenomena**, for which we envisage a **materials design** and novel **non-equilibrium** phenomena should be realised. Studies in the 2014 academic year include:

- **Superconductivity**
 - High-Tc cuprates: material- and pressure-dependence [1,2]
 - Iron-based superconductors [3]
 - Electron-phonon systems: supersolid and quantum critical point [4]
 - Organic and carbon-based superconductors [1]
 - Fermion and boson systems on flat-band systems
- **Topological systems**
 - Topological Mott insulator designed for cold atoms [5]
 - Topological and chiral properties of graphene and silicene [6-8]
 - Graphene quantum dot
- **Non-equilibrium phenomena**
 - Non-equilibrium dynamical mean field and dynamical cluster theories[9,10]
 - Floquet topological insulator
 - Relaxation in electron-phonon systems [11]
 - Nonequilibrium quantum spin systems [12]
 - Higgs modes in superconductors [13,14]

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[3] H. Aoki and H. Hosono: A superconducting surprise comes of age, *Physics World*, Feb. 2015, p.31.

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