[L17] Challenges in density-functional theory: strong electron correlation, electronic excitations and open systems.

Bruno Senjean*, Killian Deur*, Laurent Mazouin*, M. Tsuchiizu**, N. Nakatani***, M. Saubanère§, and Emmanuel Fromager*

**Laboratoire de Chimie Quantique, Institut de Chimie, Université de Strasbourg, 4 rue Blaise Pascal, 67000 Strasbourg, France*
*** Department of Physics, Nara Women's University, Nara 630-8506, Japan*
**** Department of Chemistry, Graduate School of Science and Engineering, Tokyo Metropolitan University, 1-1 Minami-Osawa, Hachioji, Tokyo 192-0397, Japan*
§ Institut Charles Gerhardt Montpellier, UMR 5253 CNRS-UM-ENSCM, Université de Montpellier, Place E. Bataillon, Bât 15, cc 1501, 34095 Montpellier cedex 5 - France

In this talk I will present our recent developments in the field of density-functional theory (DFT). I will first address the problem of strong electron correlation and how in-principle-exact DFT-based embedding techniques such as *site-occupation embedding theory* (SOET) [1-5] can be developed for model Hamiltonians such as the Hubbard Hamiltonian. Generalizations to *ab initio* quantum chemical Hamiltonians [6] will be briefly mentioned. If time permits, I will also present a unified formulation of the so-called fundamental and optical gap problems in DFT [7-9]. The practical consequences of such a formulation will be discussed.

Bibliography:

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