

# Physikalisches Kolloquium



Prof. Robert Moszynski, QChL, University of Warsaw, Poland:

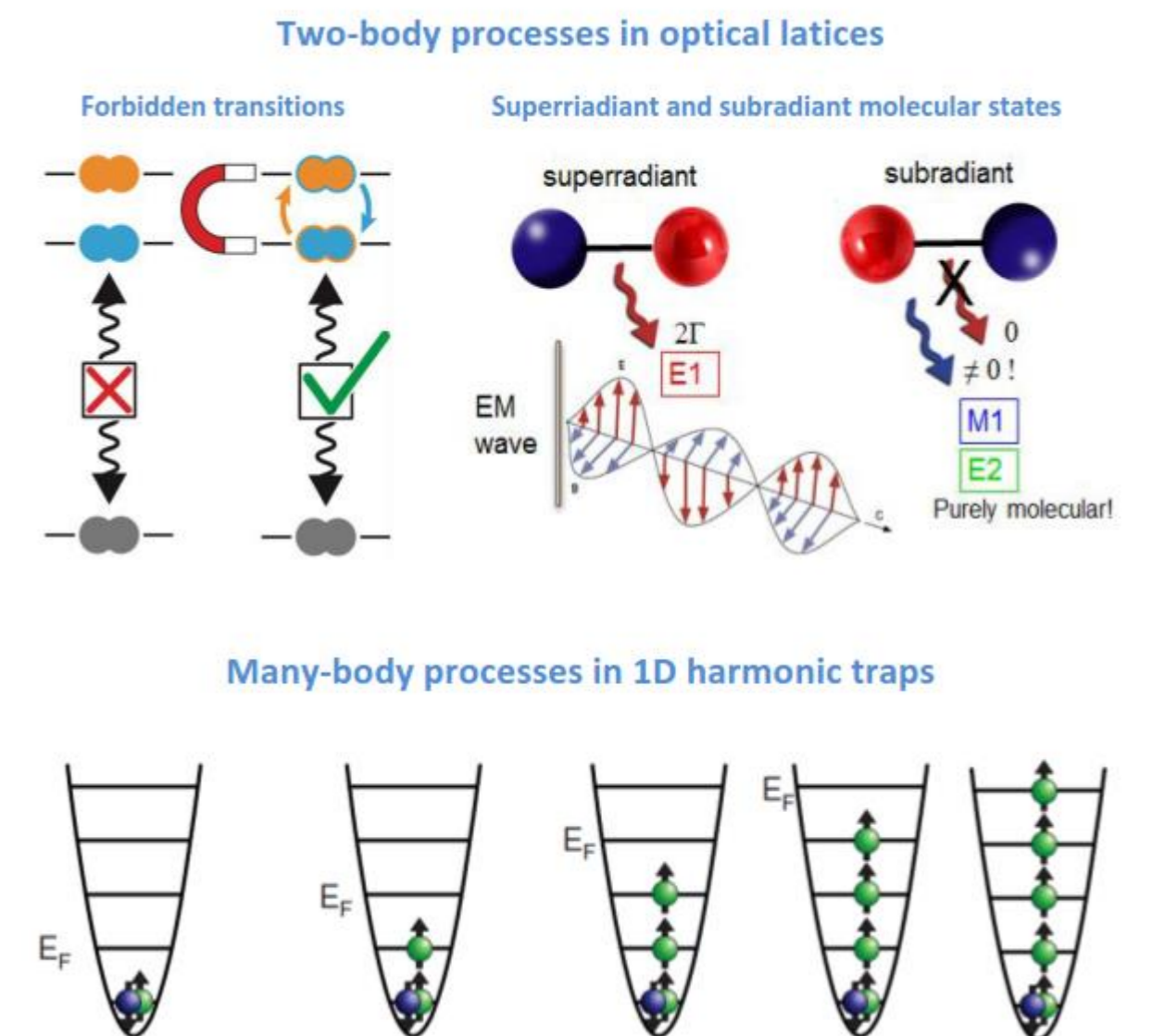
Thursday, 19.11.2015, 17:00, HS 100  
 Reception with coffee & cookies 16:45

## *Two-body and many-body physics in the ultracold regime: a quantum chemist's perspective*

### Abstract

State-of-the-art ab initio methods of quantum chemistry have found numerous applications in many areas of atomic, molecular, condensed matter, and nuclear physics. During the last decade they have been applied with success to interpret precision experiments on two-body and many-body processes in atomic gases in the ultracold regime. In this talk I will present recent examples of successful applications of the ab initio methods to describe two-body processes in atomic optical lattices leading to the formation of unusual chemical bonds and to observations of exotic optical transitions in diatomic molecules [1-3], as well as to many-body processes in one-dimensional harmonic traps of identical fermionic spin-1/2 atoms [4,5]. All reported theoretical results will be illustrated by an extensive comparison between theory and experiments.

1. B. H. McGuyer, M. McDonald, G. Z. Iwata, M. G. Tarallo, W. Skomorowski, R. Moszynski, and T. Zelevinsky, *Nature Phys.* 11, 32 (2015).
2. B. H. McGuyer, C. B. Osborn, M. McDonald, G. Reinaudi, W. Skomorowski, R. Moszynski, and T. Zelevinsky, *Phys. Rev. Lett.* 111, 243003 (2013).
3. B. H. McGuyer, M. McDonald, G. Z. Iwata, W. Skomorowski, R. Moszynski, and T. Zelevinsky, *Phys. Rev. Lett.* 115, 053001 (2015).
4. T. Grining, M. Tomza, M. Lesiuk, M. Przybytek, M. Musiał, P. Massignan, M. Lewenstein, and R. Moszynski, *New J. Phys.* (2015), in press; arXiv:1508.02378.
5. T. Grining, M. Tomza, M. Lesiuk, M. Przybytek, M. Musiał, R. Moszynski, M. Lewenstein, and P. Massignan, arXiv:1507.03174.



All of you interested in physics are cordially invited!