

Hidden quasi-symmetry in optical absorption of quantum dot nanorings

Ioan Bâldea^{a,b} and Lorenz S. Cederbaum^a

^aTheoretical Chemistry, University of Heidelberg, INF 229, D-69120 Heidelberg, Germany

^bISS, National Institute for Lasers, Plasmas, and Radiation Physics, POB MG-23, RO-077125
Bucharest, Romania

We present exact numerical results demonstrating the existence of a hidden dynamical quasi-symmetry in the optical absorption of finite nanorings consisting of metallic quantum dots, causing that, out of a multitude of transitions allowed by spatial symmetry, all but one are practically forbidden. This result is very intriguing in view of the fact that the ground state as well as the excited states are strongly correlated. For more practical purposes, we propose a new method to conduct experiments on optical absorption in nanorings allowing to get more information on nanostructures. To describe the nanorings, we employ an extended Hubbard model with parameter values well documented for quantum dots of silver. Therefore, although our primary interest is to study physical phenomena in quantum dot nanostructures, the present results are also relevant for the one dimensional extended Hubbard model itself.