MO 13: Stossprozesse, Energietransfer II (gemeinsam mit A)

Zeit: Donnerstag 11:00–12:15 Raum: 3F

Gruppenbericht MO 13.1 Do 11:00 3F

High-resolution electron collision spectroscopy of the elementary second-row molecular ions — •O. Novotny[1], M.H. Berg[1], D. Bing[1], H. Buhr[1,2], H. Fadil[1], M. Froese[1], J. Hoffmann[1], A.S. Jaroshevich[3], B. Jordan-Thaden[1], C. Krantz[1], M. Lange[1], M. Lestinsky[1], M.B. Mendes[1], S. Novotny[1], D.A. Orlov[1], A. Petrignani[1], S. Reinhardt[1], T. Sorg[1], and A. Wolf[1] — [1]Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, D-69117 Heidelberg, Germany — [2]Department of Particle Physics, Weizmann Institute of Science, Rehovot 76100, Israel — [3]Institute of Semiconductor Physics, 630090 Novosibirsk, Russia

The fundamental molecules composed of atoms from the second row of the periodic table (C,N,O,F) have a rich structure of excited potential curves that can be probed at high energy resolution by observing fragmentation processes following collisions with quasi-monochromatic electrons. Experiments of this type are performed in merged electron and ion beams at the ion storage ring TSR in Heidelberg. Using a cold, photocathode-produced electron beam, experiments on the system CF^+ yield rich structure in the collision energy dependence of both dissociative recombination and excitation. Moreover, the final atomic levels reached in the fragmentation can be observed, shedding light on their correlation to the collisionally populated excited molecular potentials.

MO 13.2 Do 11:30 3F

Relativistic and non-relativistic LDA, benchmark results and investigation on the dimers Cu_2, Ag_2, Au_2, Rg_2. — •Ossama Kullie — University of Kassel, Department of Natural Science, Institute of Physics

Using two spinor minimax method combined with finite element methods accompanied with extrapolation and counterpoise techniques enable us to obtain relativistic highly accurate results for two atomic molecules. Like in our previous work for the (Hartree-) Dirac-Fock-Slater (DFS) functional approximation, we investigate in this work the density functional approximations of the relativistic and nonrelativistic local-density functional, presenting highly accurate benchmark results of chemical properties on the dimers of the group 11(Ib) of the periodic table of elements. The comparison with DFS, with experimental and literature's results shows that DFS is better behaved than the other two local functionals.

1-O. Kullie, H. Zhang and D. Kolb, submiited to Chem. Phys.. (2007) 2-O. Kullie, H. Zhang, J. Kolb and D. Kolb, J. Chem. Phys. **125**, 244303 (2006)

MO 13.3 Do 11:45 3F

Semiclassical treatment of non-Markovian dissipative quantum dynamics — •Werner Koch[1], Frank Grossmann[1], Jürgen Stockburger[2], and Joachim Ankerhold[2] — [1]Institut für Theoretische Physik, Technische Univeristät Dresden, 01062 Dresden — [2]Institut für Theoretische Physik, Universität Ulm, Albert-Einstein-Allee 11, 89069 Ulm

Any realistic system is coupled to its environment even if this coupling is very weak. The influence of the environment can result in dissipation of energy as well as decoherence of states in the system. Both effects have to be taken into account to accurately describe the time evolution of a state prepared in the system. A model system for the study of these effects is a single oscillator, linearly coupled to a bath of oscillators with a fixed temperature. The dynamics of the heat bath is treated using the influence functional formalism [1]. We show numerical results for the system under the influence of the heat bath using semiclassical techniques in initial value representation [2]. Issues arising during such calculations are discussed.

[1] Feynman, R. P. & Vernon, F. L.. "The theory of a general quantum system interacting with a linear dissipative system." Annals of Physics, no. 24 (1963): 118-173.

[2] Herman, M. F. & Kluk, E.. "A semiclassical justification for the use of nonspreading wavepackets in dynamics calculations." Chemical Physics, vol. 91 (1984): 27-34

MO 13.4 Do 12:00 3F

A systematic study of the beta-decay properties — •Ivan Borzov[1], Jose Cuenca-García[1], Karlheinz Langanke[1], Gabriel Martínez-Pined[1], and Fernando Montes[2] — [1]GSI, Darmstadt, Plankstr. 1, D-64291, Darmstadt, Germany — [2]National Superconducting Cyclotron Lab., Michigan State University, East Lancing, MI 48824, USA

A self-consistent approach to the nuclear ground states and spin-excitations based on the local energy-density functional (DF) theory and continuum QRPA is presented. Systematic calculations of the total β-decay rates for the nuclei with charge numbers Z=24-31, 42-49, 72-78, 82-89 approaching the possible r-process paths in vicinity of the spherical neutron shells at N=50, 82, 126 are calculated and compared with the experimental data. When available, the half-lives obtained on the basis of the Finite Range Droplet Model and the shell model are compared to our results. The effects of our calculated half-lives on the r-process abundances in the A=90-130 mass region are explored in r-process simulations.

1.J.J. Cuenca- Garcia, G. Martinez-Pinedo, K. Langanke, F. Nowacki, I.N. Borzov, 2007, Eur.J.Phys. epja/i2007-10477-3. 2.Kurtukian-Nietto T., Benluire J, and GSI Collaboration First access to beta half-lives approaching the r-process path near N=126., 2007, (submitted to Phys. ReV. Lett); nucl-ex 0711.0101. 3.I.N. Borzov, J.J. Cuenca- Garcia, G. Martinez-Pinedo, K. Langanke, F. Montes, 2007, (submitted to Nucl.Phys. A).