chemisch
physikalische
gesellschaft

Gegründet im Jahre 1869 von H. Hlasiwetz,
J. Loschmidt, J. Petzval und J. Stefan

Gesellschaft der Freunde der
Universität Tel Aviv
in Österreich

EINLADUNG

zum Vortrag von

Prof. Dr. Joshua Jortner
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über

Cluster Coulomb Explosion Driving Nuclear Fusion in the Physical Chemistry Laboratory

am

Dienstag, dem 25. Jänner 2005, um 17.30 Uhr

im Großen Hörsaal des Instituts für Experimentalphysik der Universität Wien
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Abstract:

Ultraintense table top lasers are characterized by a maximal intensity of $I \sim 10^{20}$ Wcm^{-2}, which constitutes the highest light intensity on earth. Novel features of light – matter interactions emerge from the interaction of clusters with ultrashort (pulse temporal width τ = 10–100 fs) and ultraintense ($I = 10^{15}$–10^{20} Wcm^{-2}) laser fields. The modern research area of ultrafast femtosecond cluster nuclear dynamics is transcended by moving towards ultrafast attosecond-femtosecond electron dynamics in ultraintense fields.

Extreme cluster multielectron ionization (involving the stripping of all electrons from light – first row atoms and the formation of heavily charged ions, e.g., Xe^{36+} at $I = 10^{19}$ Wcm^{-2}) is distinct from that of single atomic or molecular species in terms of mechanisms, the ionization level and time scales for electron and nuclear motion. The electron dynamics processes trigger nuclear dynamics, which involves cluster Coulomb explosion with the production of highly energetic (keV – MeV) multicharged ions on the fs time scale.

An interesting novel development involves dd nuclear fusion driven by Coulomb explosion (NFDCE) in an assembly of deuterium containing homonuclear $(D_2)_n$ clusters and heteronuclear clusters, e.g., $(D_2O)_n$, $(CD_4)_n$ or $(DI)_n$. This remarkable development accomplishes an 80 years quest for the attainment of cold–hot nuclear fusion in the chemical physics laboratory.