VANDERBILT UNIVERSITY

Department of Physics and Astronomy

NanoFemto Group & OCM Seminar

Monday 11th April 2005, 2:15 PM
Room: SC 4327

Ultrafast Dynamics in Building Blocks of Life

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Life on earth began before enough ozone built up in the atmosphere to screen out intense ultraviolet (UV) solar irradiation. Thus, DNA had to be exceptionally resistant to photo-induced structural damage. Because of the complexity of DNA structure, the origin of its resilience is difficult to probe. As we reported recently (Schultz et al. **Science 306,** 2004, p. 1765) we have studied gas-phase 2-aminopyridine clusters, which model isolated hydrogen bonded DNA base pairs. Using time-resolved photoionization, we found that the planar H-bonded dimer dissipates UV excitation energy within 65 picoseconds, more than 20 times faster than the monomer or larger clusters. Ab initio calculations implicated an intermediate state, formed by transient charge and proton transfer through the H-bond, to account for the rapid relaxation.

Hence, this talk will be about hydrogen bonds as molecular sunscreens in DNA bases but also about much faster processes involving conical intersections between photo-excited states in typical chromophore molecules of biological relevance such as indole and finally – as some sort of contrast programme - about the chances of cutting molecular bonds in peptides by judiciously shaped, intense femtosecond laser pulses.

If you would like to meet the speaker please contact Tobias Hertel (phone 322-2864, e-mail: tobias.hertel@vanderbilt.edu or via http://people.vanderbilt.edu/~tobias.hertel)