Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

UV exposed electronically activated damage and photoreactivation repair HENRIK BOHR, Technical University of Denmark, BARY MALIK, Southern Illinois University — An investigation of the possible physics underlying the damage caused to DNA by UV radiation and its subsequent repair via a photoreactivation mechanism is presented in this study. An electronic pathway starting from the initial damage to the final repair process is proposed. UV radiation is absorbed to create a hole-excited thymine or other pyrimidine that subsequently is responsible for the formation of the thymine dimer. The negative-ion of the cofactor riboflavin, FADH-, formed by the exposure of the photolyase protein to visible light interacts with the hole-excited electronic orbital of the thymine dimer inducing a photon-less Auger transition, which restores the two thymines to the ground state, thereby detaching the lesion and repairing the DNA. Due to energy balance, the process has to involve an electronic excited state (s). The mechanism involves the least amount of energy dissipation and is charge neutral. It also avoids radiation damage in the repair process, that is, is a radiationless process.

Henrik Bohr
Technical University of Denmark

Date submitted: 21 Nov 2006 Electronic form version 1.4