

Abstract Submitted  
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**Can the Isomerization of Retinal in Bacteriorhodopsin be Coherently Controlled in Strong Fields?** VALENTYN PROKHORENKO<sup>1</sup>, University of Toronto, Chemistry Department, ALEXEI HALPIN, University of Toronto, Physics Department, PHILIP JOHNSON, University of Toronto, Chemistry Department, LEONID BROWN, University of Guelph, Physics Department, DWAYNE MILLER, University of Toronto, Chemistry and Physics Departments — Conflicting results have been obtained between weak field experiments (one-photon absorption) [1] and strong field recent studies [2] (multi-photon effects). Here we present our strong field experiments performed using linearly-chirped excitation pulses. Contrary to [2], we clearly observe phase-dependent control of photoproduct yield over a wide range of excitation energies. Above the excitation limit of  $\sim 200$  GW/cm<sup>2</sup> our results do however come into agreement with [2], but only for a single observation wavelength (650 nm) whereas the transient spectra unambiguously show drastic changes in the protein due to its ionization. At these excitation levels, this deleterious side channel precludes correct determination of the amount of 13-cis isomer. As such, we argue that it is impossible to make assignments of mechanistic details of control at a high field that in effect “kills” the protein. [1] V. I. Prokhorenko, A. M. Nagy, S. A. Waschuk, L. S. Brown, R. R. Birge, and R. J. D. Miller, *Science* 313, 1257- 1261 (2006). [2] A. C. Florean et al., *PNAS* 106, 10896-10900 (2009).

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