Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Coherent Control of Retinal Isomerization in Bacteriorhodopsin in the High Intensity Regime ANDREI FLOREAN, University of Michigan at Ann Arbor, DAVID CARDOZA, JAMES WHITE, Stanford University, JANOS LANYI, University of California, Irvine, ROSEANNE SENSION, University of Michigan at Ann Arbor, PHILIP BUCKSBAUM, PULSE Center/Stanford University — We use a learning algorithm to optimize retinal isomerization in bacteriorhodopsin. Excitation fluence levels up to 1.5 x 10^{17} photons/cm^2 (upper estimate) are employed. At fluences below 0.5 x 10^{17} photons/cm^2 no sensitivity of the yield with respect to phase is observed. Above this level the learning algorithm consistently finds that a transform-limited (TL) pulse is optimal for maximizing the isomerization yield (13-cis population). For this optimal pulse the yield increases linearly beyond the saturation of the first excited state. To understand these results we performed systematic searches varying the chirp, bandwidth and energy of the pump pulses while monitoring the isomerization yield. The results are modeled including the influence of one-photon and multi-photon transitions. The analysis reveals that phase and intensity impact the wave packet dynamics in each intermediate conformation as well as the final branching ratio between the all-trans and 13-cis isomers.

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Date submitted: 04 Feb 2008 Electronic form version 1.4