Abstract Submitted for the MAR06 Meeting of The American Physical Society

Femtosecond Coherent Raman Spectroscopy in Biomolecules ZOE-ELIZABETH SARIYANNI, YURI ROSTOVTSEV, Dept. of Physics and Inst. for Quantum Studies, Texas A&M University, College Station, TX 77843, TORSTEN SIEBERT, WOLFGANG KIEFER, Institut für Physikalische Chemie, Universität Würzburg, 97074 Würzburg, Germany, GUY BEADIE, JOHN REIN-TJES, US Naval Research Lab, Code 5614, 4555 Overlook Ave., Washington, DC 20375, MARLAN SCULLY, Dept. of Physics, Electrical and Chemical Engineering and Inst. for Quantum Studies, Texas A&M University, College Station, TX 77843 — We present a scheme for identification of biomolecules in real time by using Coherent Anti-Stokes Raman Spectroscopy (CARS) with femtosecond pulses. The nonlinear interaction of the pulses with the molecules is calculated analytically as well as numerically and comparison is made with the experimental results. We show that the commonly used rotating wave approximation needs to be waved for our fast dephasing molecules. Propagation effects are simulated, in addition to the nonlinear interaction, and it is shown how one needs to balance the electronic resonance enhancement and the losses due to absorption, in order to maximize the signal at the output of the optically dense medium. In the transient regime, we present and analyze the generation of polarization beats. These beats are generated due to the very broad bandwidth of the femtosecond pulses, which allows for the coupling of more that one vibrational modes at a time.

> Zoe-Elizabeth Sariyanni Dept. of Physics and Inst. for Quantum Studies, Texas A&M University, College Station, TX 77843

Date submitted: 30 Nov 2005

Electronic form version 1.4