Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

Sub-femtosecond Control of Hydrogen-Bond Rearrangement[1]
ALI S. ALNASER, Department of Physics, American University of Sharjah, K. BETSCH, Kansas State University, M. KÜBEL, Max-Planck-Institut für Quantenoptik, Garching, Germany, R. SIEMERING, Ludwig-Maximilians-Universität München, Germany, B. BERGUES, Max-Planck-Institut für Quantenoptik, Garching, Germany, N.G. KLING, I. BEN-ITZHAK, Kansas State University, Y. DENG, Max-Planck-Institut für Quantenoptik, Garching, Germany, Z.A. ALAHMED, A.M. AZZEEER, King Saud University, R. MOSHAMMER, J. ULRICH, Max-Planck-Institut für Kernphysik, Heidelberg, Germany, U. KLEINEBERG, R. DE VIVIE-RIEDLE, Ludwig-Maximilians-Universität München, Germany, F. KRAUSZ, M.F. KLING, Max-Planck-Institut für Quantenoptik, Garching, Germany — We present experimental and theoretical data supporting a new and very general coherent control scheme, where the directional hydrogen migration in hydrocarbon molecules is initiated via light-driven attosecond electron motion. The strong coupling between electron and nuclear motions allows for efficient control of both electrons and heavier nuclei within the wave cycle of near-single-cycle laser pulses. We show that the waveform of the near-single-cycle laser pulses can be tailored to preferentially steer protons to different sites of the hydrocarbons prior to the molecular disintegration by the strong laser fields.

[1]We acknowledge supports from the American University of Sharjah, DFG and the Cluster of Excellence: Munich Center for Advanced Photonics, U.S. Department of Energy, the NSF and the MPQ-KSU collaboration.

Ali.S. Alnaser
Department of Physics, American University of Sharjah

Date submitted: 28 Dec 2012 Electronic form version 1.4