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Attosecond time delays in the nuclear dynamics of strong-field molecular dissociation GREG ARMSTRONG, J R MacDonald Laboratory, Kansas State University, ULTRAFAST MOLECULAR PHYSICS GROUP COLLABORATION[1] — The relative time delay in the photoemission from neighboring atomic valence sub-shells has become an area of considerable recent interest, with delays of tens of attoseconds reported in pump-probe experiments for a number of atomic targets. Such delays may be extracted, for example, from phase differences in the photoelectron energy spectra for the different sub-shells as a function of delay between pump and probe pulses. The focus of such experiments has, to date, been atomic targets, on the assumption that only electronic motion can lead to delays on the attosecond scale.We investigate the molecular analogue of such studies by calculating the kinetic-energy release (KER) spectrum for neighboring vibrational states as a function of pump-probe delay time. In particular, we focus on molecular targets where electronic excitation is negligible, and show that attosecond time delays are also possible for purely nuclear motion. We will present evidence of these attosecond delays derived from both numerical solutions of the time-dependent Schrödinger equation and experiment. We analyze and understand the observed shifts using the photon-phase formalism [1,2]. [1]V. Roudnev and B. D. Esry, Phys.Rev.Lett. 99 220406 (2007). [2] J.J.Hua and B. D. Esry, J. Phys.B 42 085601 (2009).

[1]G.S.J.Armstrong, J.McKenna, B.Gaire, M.Zohrabi, B.Berry, B.Jochim, Kanaka Raju, P., P.Feizollah, K.D.Carnes, Ben-Itzhak, B.D. Esry

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