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Turning ethanol into water and hydronium: experimentally determining the roles of each hydrogen site[1] T. SEVERT, B. KADERIYA, P. FEIZOLLAH, B. JOCHIM, F. ZIAEE, K. BORNE, KANAKA RAJU P., K. D. CARNES, D. ROLLES, A. RUDENKO, I. BEN-ITZHAK, J.R. Macdonald Laboratory, Physics Department, Kansas State University, Manhattan, KS 66506, USA, N. EKANAYAKE, M. NAIRAT, N. P. WEINGARTZ, B. M. FARRIS, B. G. LEVINE, J. E. JACKSON, M. DANTUS, Department of Chemistry, Michigan State University, East Lansing, MI 48824, USA — Ultrafast hydrogen migration has been extensively studied in a variety of small hydrocarbons such as the acetylene-vinylidene isomerization reaction. In this talk, we study the formation of water and hydronium cations from ethanol induced by an ultrafast intense laser-field, where one or two hydrogens migrate, respectively, and form bonds with the OH moiety. Due to the complexity of the ethanol molecule, the migrating hydrogens can originate from multiple sites within the molecule. By studying various isotopologues of ethanol and employing coincidence momentum imaging, the origins of the migrating hydrogens can be determined. In particular for the formation of hydronium, we experimentally determine that both hydrogens can migrate from either the CH_3 or the CH_2 sites, or one hydrogen can migrate from each of these sites.

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