Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

**Substituent Effects on The Mechanisms and Dynamics of $H_3^+$ Formation from Organic Molecules In Strong Fields**[1] MARCOS DANTUS, NAGITHA EKANAYAKE, MUATH NAIRAT, NICHOLAS WEINGARTZ, BENJAMIN FARRIS, MATTHEW MICHIE, Michigan State Univ, TRAVIS SEVERT, BALRAM KADERIYA, PEYMAN FEIZOLLAH, BETHANY JOCHIM, FARZANEH ZIAEE, KURTIS BORNE, PANDIRI KANAKA RAJU, KEVIN CARNES, DANIEL ROLLES, ARTEM RUDENKO, Kansas State University, JAMES JACKSON, BENJAMIN LEVINE, Michigan State Univ, ITZIK BEN-ITZHAK, Kansas State University — Recent studies from our groups combining femtosecond time-resolved dynamics, photoion-photoion coincidence measurements, and theory have provided evidence for the existence of two reaction pathways for the formation of $H_3^+$ from methanol under strong-field ionization. Both reaction pathways are initiated by the ultrafast double ionization of the parent molecule and proceed through prompt formation of a roaming neutral $H_2$ molecule. The roaming $H_2$ fragment abstracts a third proton from the methyl carbon or from the hydroxyl oxygen leading to the formation of $H_3^+$. We have extended the study to a series of alcohols presenting an increased number of hydrogen atoms and thus $H_3^+$ formation pathways: methanol ($CH_3OH$), ethanol ($CH_3CH_2OH$), 1-propanol ($CH_3CH_2CH_2OH$), 2-propanol ($CH_3CH(OH)CH_3$), and tert-butanol ($(CH_3)_3COH$). Similarly, we have studied the substitution of oxygen with sulfur, comparing ethanol and ethanethiol. We will discuss the new pathways found and their relative yields.

[1] This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, Atomic, Molecular and Optical Sciences Program under Award Number SISGR (DE-SC0002325).

Marcos Dantus
Michigan State Univ

Date submitted: 06 Feb 2019

Electronic form version 1.4