

## QUANTIFICATION OF METHANOL PHOTOLYSIS BRANCHING RATIOS USING MULTIPLEXED PHOTOIONIZATION MASS SPECTROMETRY

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Over 250 distinct chemical species have been detected in the interstellar regions of space. The harsh conditions of astrophysical objects mean that the molecules that form and evolve there are not subject to the same reaction conditions as on Earth. The products formed upon UV excitation of methanol, an extremely prevalent molecule in space, have not been well constrained. In a collaborative project between UMD and two government research labs—Sandia National Laboratories and Lawrence Berkeley National Laboratory—we carried out UV photodissociation studies on gas-phase methanol using 193 nm light at the Advanced Light Source synchrotron. We have identified and quantified the photodissociation products and their associated branching ratios via Multiplexed Photoionization Mass Spectrometry. Empowered by the tunability of the synchrotron source, isomeric products such as  $\text{CH}_3\text{O}/\text{CH}_2\text{OH}$  and  $\text{HCOH}/\text{H}_2\text{CO}$  were able to be differentiated at different ionization energies, providing a more complete understanding of each species independently. The results of this work will inform astronomers of the destruction processes possible for this important astrochemical in regions of space with high ultraviolet radiation fields.