A MM/SUBMM WAVE SPECTROMETER TO QUANTIFY ASTROCHEMICAL REACTION RATES

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Complex organic molecules (COMs) are being routinely detected at millimeter and submillimeter wavelengths toward a variety of interstellar environments. There is a growing consensus that their formation is dominated by barrierless, diffusion-limited addition reactions of radicals on icy grain surfaces. While astrochemical models have predicted the presence of many of these COMs, discrepancies have arisen between their observed and predicted relative abundances. It is likely that these discrepancies arise from uncertainties in the rates for the dissociation reactions that form the precursor radicals. More complete laboratory information is needed to improve the predictive power of astrochemical models of organic chemistry. We have developed a laboratory experiment that utilizes mm/submm wave direct absorption spectroscopy to probe photodissociation branching ratios that are relevant to astrochemical models of complex organic chemistry. We have benchmarked the performance of this spectrometer by examining the dissociation of methanol using a high-voltage discharge source. We will report on these results, and the progress of utilizing this spectrometer for photodissociation studies of COMs and COM precursors.