

Brett McGuire (NRAO CV)

Interstellar Reaction Screening via Microwave Spectral Taxonomy

I present a recently-developed methodology for investigations of reaction pathways, and new molecular discovery, using microwave spectroscopy. Rather than a targeted effort to study a single species of interest, precursor molecules are chosen which, when subjected to electric discharge, produce astrochemically-relevant reactive species. The reaction products are then probed in an unbiased fashion using Microwave Spectral Taxonomy. I will present a study of carbon disulfide (CS₂) and diacetylene (HC₄H) discharge products relevant to carbon star environments like IRC+10216. Over 60 species, including numerous isotopologues and vibrationally-excited states, are identified from this simple mixture. I will discuss the insights into reaction pathways, the variety of species formed, and the utility of the technique in general application.