PREBIOTIC ASTROCHEMISTRY IN THE "THz-GAP"

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Small reactive organic molecules are key intermediates in interstellar chemistry, leading to the formation of biologically-relevant species as stars and planets form. These molecules are identified in space via their pure rotational spectral fingerprints in the far-IR or terahertz (THz) regime. Despite their fundamental roles in the formation of life, many of these molecules have not been spectroscopically characterized in the laboratory, and therefore cannot be studied via observational astronomy. The reason for this lack of fundamental laboratory information is the challenge of spectroscopy in the THz regime combined with the challenge of studying unstable molecules. Our laboratory research involves characterization of astrophysically-relevant unstable species, including small radicals that are the products of photolysis reactions, organic ions formed via plasma discharges, molecules released during UV and thermal processing of interstellar ice analogs, and small reactive organics that form via O(^{1}D) insertion reactions. Our observational astronomy research seeks to examine the chemical mechanisms at play in a range of interstellar environments and to identify chemical tracers that can be used as clocks for the star-formation process. In this talk, I will present recent results from our laboratory and observational studies that examine prebiotic chemistry in the interstellar medium. I will discuss these results in the broader context of my integrative research program that encompasses laboratory spectroscopy, observational astronomy, and astrochemical modeling.