

Abstract Submitted
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Millimeter-wave Velocity Modulation Spectroscopy as a Technique to Selectively Detect Molecular Ions DEWAYNE HALFEN, LUCY ZIURYS, Departments of Chemistry and Astronomy, Steward Observatory, University of Arizona — Molecular ions are usually very unstable and reactive species. As a result, their spectroscopic features can be difficult to identify and distinguish from those of neutral species, which tend to be more stable and thus have stronger signals. The technique of velocity modulation allows this disadvantage to be removed. This method uses the alternating plus and minus polarity of an electric field created by an AC discharge, which also produces the molecular ions, to selectively detect the molecular ions, while eliminating the neutral features. This technique has been applied at infrared and optical wavelengths for many years with much success. Recently, we designed and built a millimeter-wave velocity modulation spectrometer, the first ever constructed. This instrument has been used to create and study multiple molecular ions, including metal-bearing molecular ions. The rotational spectrum of these species, such as TiCl^+ , VCl^+ , TiF^+ , FeO^+ , FeCO^+ , and SiCl^+ , has been investigated with this new machine in our laboratory. Results of these studies along with a description of the velocity modulation technique and instrument will be presented.

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