



## Using high Rydberg states to study molecular ions spectroscopically at very high resolution

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Because of their charge, ionic species cannot be produced in high concentration in the gas phase. We have recently made progress towards obtaining high-resolution spectroscopic information on molecular ions by studying molecular Rydberg states of very high principal quantum numbers ( $n > 100$ ). These high Rydberg states possess unusual physical and chemical properties that can be exploited in a variety of applications in molecular physics and measurement technology.

After presenting a survey of the properties of molecular Rydberg states, our experimental procedure, which relies on the use of a home-built narrow-bandwidth (210 kHz) broadly tunable (8-19 eV) VUV laser system, of millimeter waves, and of tailored electric field pulse sequences, will be described. Current and prospective applications will be outlined.