Laser Ablation of Alkali-Halides: Toward Understanding Ionic Dissociation at a Molecular Level

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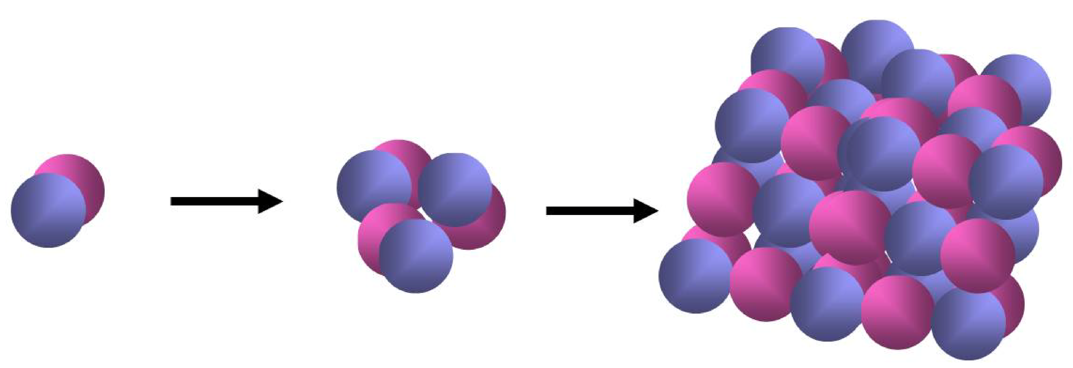
Molecular Clusters: Fundamental Chemistry

- Systems for understanding the transition from individual molecules to condensed matter



MOLECULE CLUSTER BULK

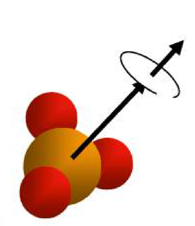
Molecular Clusters: Environmental Science

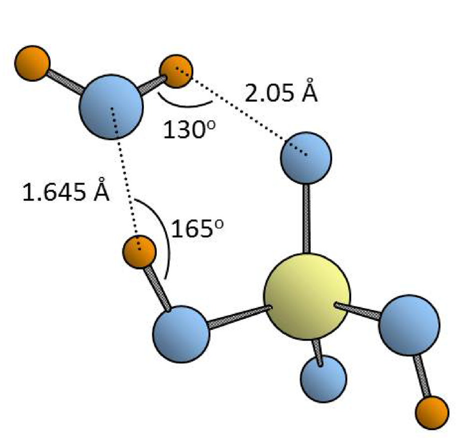
- Molecular Clusters help understand fundamental interactions relevant to:
  - Processing of tropospheric chlorine by atmospheric sea-salt aerosol
  - Formation of Acid Rain
  - Ozone Chemistry

We use microwave (rotational) spectroscopy to study molecular clusters.

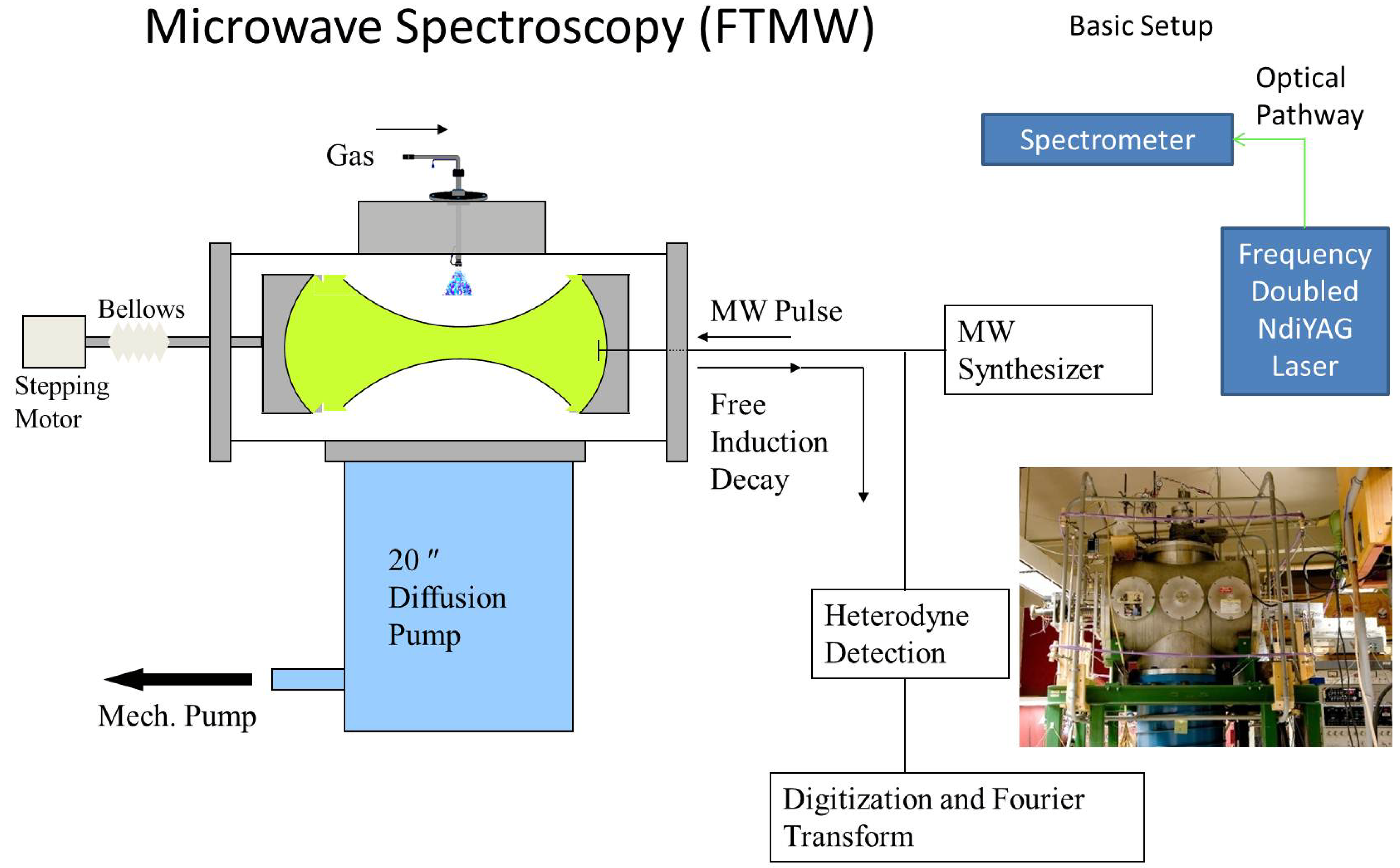
What is rotational spectroscopy?

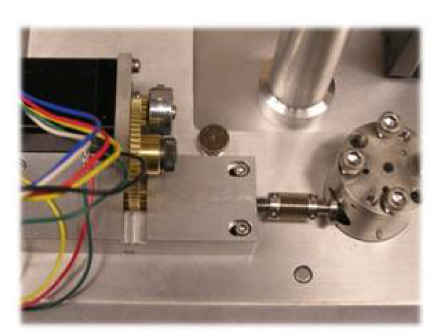
- Most accurate method of determining 3D geometry of small molecules
- Provides information about molecular and electronic structure
- (Right) Structure of H_2SO_4-H_2O complex with the bond lengths and bond angles

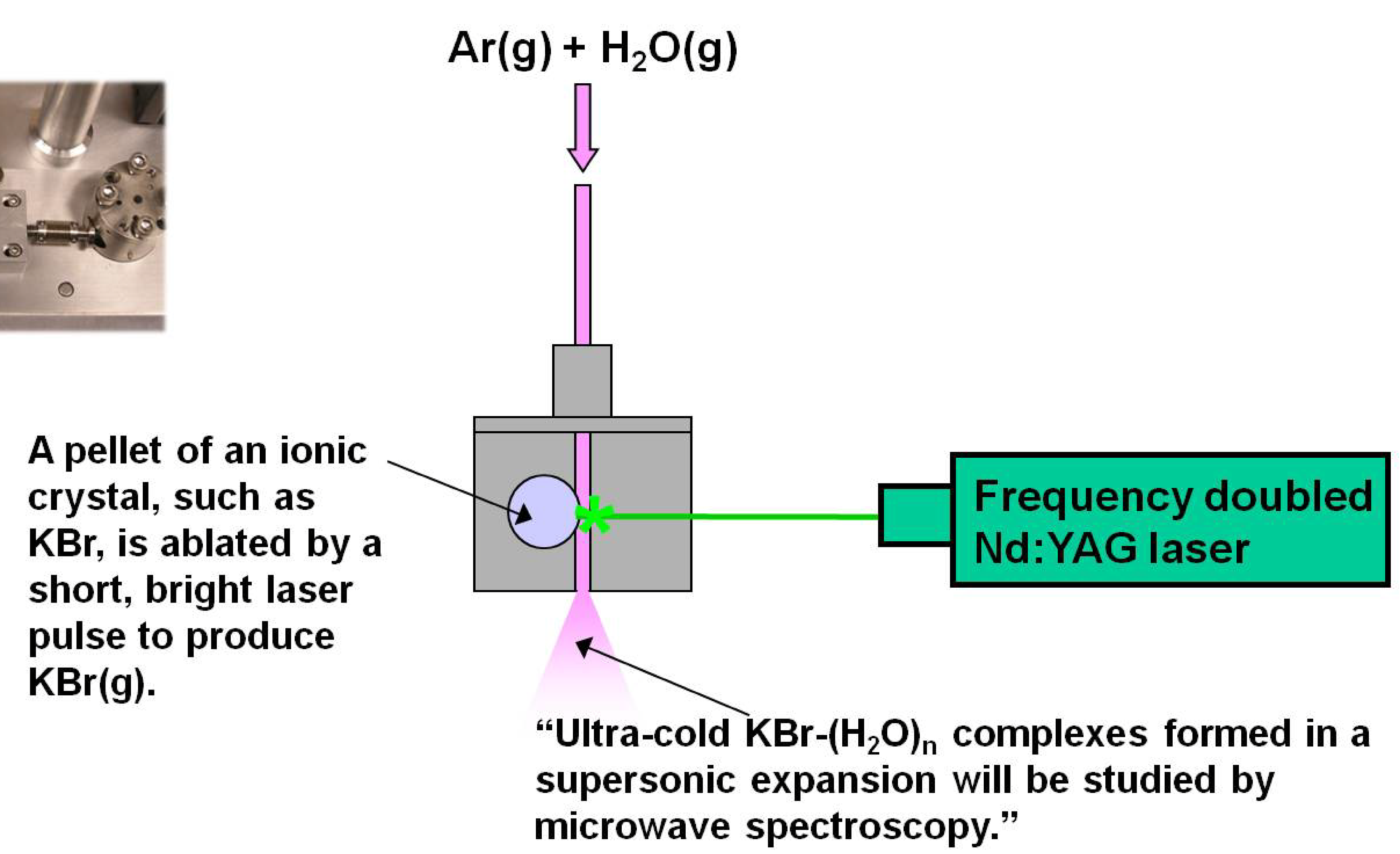




Pulsed-Nozzle Fourier Transform Microwave Spectroscopy (FTMW)



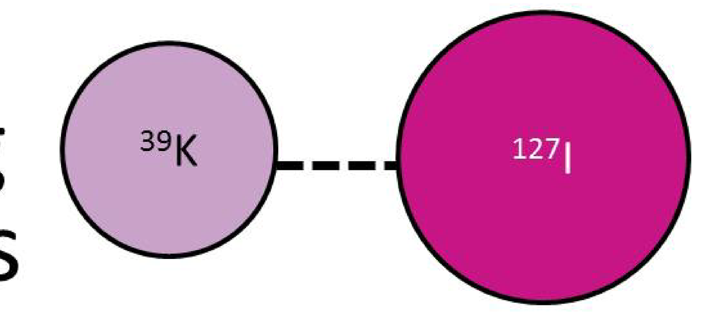


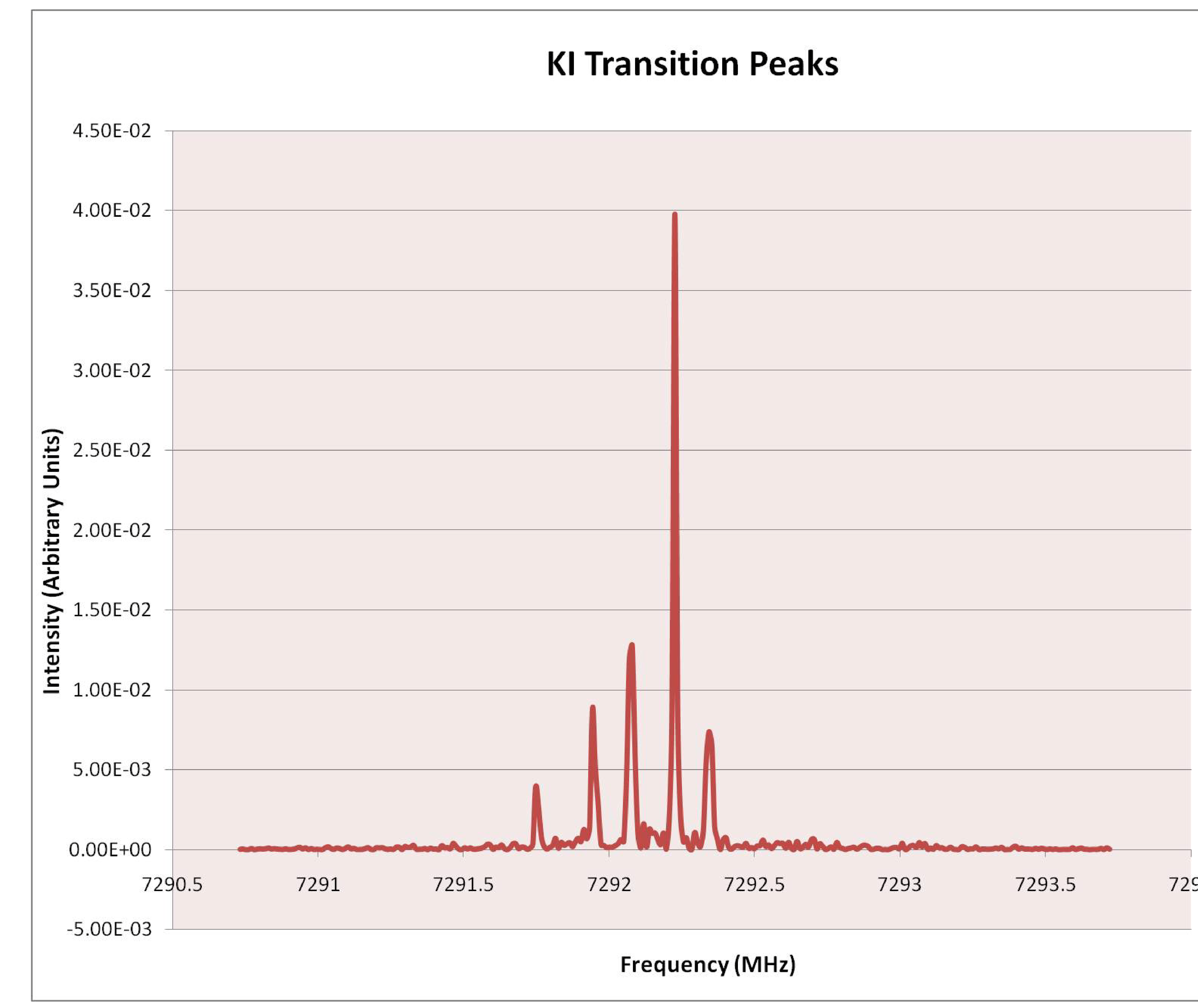


Nozzle Assembly

Our nozzle assembly utilizes a supersonic jet expansion in conjunction with a laser ablation target, allowing us to cool ablated molecules to low-lying energy levels, thus simplifying our observed spectra.

$^{39}K^{127}I$ – Observing Transitions





KI transitions have been assigned. These experiments help us optimize our production of jet cooled alkali halide monomers for future studies of simple hydrated clusters

What lies in store

- The study of hydrated complexes as a fundamental problem in cluster science
- Studying alkali-halide water complexes with water is our next goal

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