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Dissociation-aided state preparation and spectroscopy of trapped molecular ions[1] JOAN MARLER, VAISHNAVI RAJAGOPAL, BRIAN ODOM, Northwestern University — Preparation of state-selective ensembles of cold molecules is a promising starting point for precision molecular spectroscopy. Ion traps provide an ideal environment for rovibrational cooling of diatomic molecules. Ion trap life times are typically greater than hours and the Coulomb force ensures long internal-state coherence times. Additionally, co-trapped and laser-cooled atomic species provide sympathetic translational cooling down to mK temperatures. The fluorescence of the co-trapped atomic species can be used as a diagnostic for molecule formation and dissociation, with additional flexibility arising when the dissociating atomic ion is the same species as the coolant ion. Presented here are prospects for this type of spectroscopy using a Barium ion trap.

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