

Abstract Submitted
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State-selective generation of molecular ions via Rydberg states¹

DAVID GRIMES, YAN ZHOU, TIMOTHY BARNUM, STEPHEN COY, Massachusetts Institute of Technology, JEFFREY KAY, Sandia National Laboratories, ROBERT FIELD, Massachusetts Institute of Technology — Autoionizing Rydberg states of molecules in the range $n=30-50$ have the potential to enable the production of single quantum state selected ensembles of molecular ions, which have uses from spectroscopy to high precision measurements of fundamental constants [1]. Multichannel Quantum Defect Theory (MQDT) fully describes the Rydberg states of molecules and the dynamics of autoionization. We have used our full MQDT description of CaF [2] to determine optimal autoionizing resonances for producing a variety of selected rotation-vibration states of the ion. Progress towards experimental demonstrations in BaF will also be discussed.

[1] H. Loh, J. Wang, M. Grau, T. Yahn, R. Field, C. Greene, and E. Cornell, J. Chem. Phys. 135, 154308 (2011).

[2] J. Kay, S. Coy, B. Wong, C. Jungen, and R. Field, J. Chem. Phys. 134, 114313, (2011).

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