

Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Nonadiabatic effects in ultracold strontium “physicist’s molecules” via anomalous linear, quadratic, and higher order Zeeman shifts MICKEY MCDONALD, GEOFFREY IWATA, BART MCGUYER, TANYA ZELEVINSKY, Columbia University — Weakly bound ultracold Sr_2 molecules provide a rich testing ground for gaining insight into the nature of molecular bonding. We present measurements of quadratic Zeeman shifts for weakly bound molecules which scale roughly cubically with molecule size and are over a millionfold enhanced compared to free strontium atoms. From the anomalous linear shifts we obtain mixing angles for the molecular states. The nature of long-range molecular potentials and nonadiabatic Coriolis coupling explain how these non-intuitive effects arise. At large magnetic fields, cubic and quartic Zeeman shifts are clearly present, revealing higher-order mixing with nearby states. Methods of precision spectroscopy and imaging of the molecules in an optical lattice will be discussed.

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Date submitted: 30 Jan 2014

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