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Narrow Line Photoassociation in an Optical Lattice TANYA ZELEVINSKY, MARTIN M. BOYD, ANDREW D. LUDLOW, TETSUYA IDO, JUN YE, JILA, NIST, and University of Colorado, ROMAN CIURYLO, Nicholas Copernicus University, Torun, Poland, PASCAL NAIDON, PAUL S. JULIENNE, NIST, Gaithersburg — Photoassociation spectroscopy was performed on the $^1S_0$–$^3P_1$ intercombination line of ^{88}Sr in a magic wavelength optical lattice. The long lifetime of $^3P_1$ permitted the study of nine least-bound states associated with the 0_u and 1_u molecular potentials. We investigated the crossover region between dipole-dipole and van der Waals interactions, and constrained the C_3 and C_6 coefficients. We also showed that the least-bound state should enable extensive, low-loss optical tuning of the very small ground state scattering length. Narrow line photoassociation in the lattice allowed us to observe thermal line shapes even at microkelvin temperatures, as well as to explore dimensional effects.

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