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Photoassociation Rate of a ^{7}Li Bose-Einstein Condensate near a Feshbach Resonance[1] M. JUNKER, D. DRIES, Y.P. CHEN, C. WELFORD, J. HITCHCOCK, R.G. HULET, Department of Physics and Astronomy and Rice Quantum Institute, Rice University, Houston, TX 77005 — In a photoassociation (PA) process a pair of atoms collide in the presence of a resonant light field creating an excited molecule. For ultracold atoms, the rate of PA depends on the s-wave scattering length, a_s, which determines the wavefunction overlap between the collisional ground state and the excited molecular bound state. We investigate this dependence experimentally using a pure Bose condensate of ^{7}Li in the F=1, m_F=1 hyperfine state confined in an optical dipole trap. We vary a_s below the 730 G Feshbach resonance and measure the rate of loss from the condensate due to a PA pulse which couples atoms to the $v' = 83$ vibrational level of the $1^3\Sigma_g^+$ molecular state. The measured loss rate varies by more than a factor of 30 over the magnetic field range of 660 - 730 G. At 710 G the rate approaches zero, which we attribute to a node in the ground state wavefunction. We also compare the PA loss rate in a BEC to a thermal gas over this same range of magnetic fields.

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