

Abstract Submitted
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Measurement of the Photoassociation Rate in a BEC of ${}^7\text{Li}$ ¹ M. JUNKER, D. DRIES, Y. CHEN, C. WELFORD, J. HITCHCOCK, R. G. HULET, Department of Physics and Astronomy and Rice Quantum, Institute, Rice University — Photoassociation is a process of producing molecules from a collision of two atoms. The maximum rate is limited by quantum mechanical unitarity and by a proposed mechanism involving photodissociation of bound molecules into the continuum. In the unitarity limit, the rate scales as $n \cdot T^{-0.5}$. In the photodissociation mechanism, the rate depends on coupling to the quasicontinuum resulting in saturation at high intensities at a value of $\hbar n^{2/3}/m$.² The rate of photoassociation has previously been observed to saturate in a non-condensed, but quantum degenerate sample of atomic ${}^7\text{Li}$ to a value consistent with the unitarity limit.³ A Bose-Einstein condensate (BEC) is necessary to differentiate between unitarity and photodissociation. We will create a large BEC in an optical dipole trap in the $F=1$, $m_F=1$ hyperfine state in order to distinguish between these two proposed mechanisms.

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²J. Javanainen and M. Mackie, *Phys. Rev. A* **59**, R3186 (1999).

³I. D. Prodan *et al.*, *Phys. Rev. Lett.* **91**, 080402 (2003).

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