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**The Efimov Effect and Color Superconductivity in a Three-State Fermi Gas** J.R. WILLIAMS, E.L. HAZLETT, J.H. HUCKANS, R.W. STITES, Y. ZHANG, K.M. O'HARA, The Pennsylvania State University, University Park, PA 16802-6300 — We have created a quantum degenerate $^6$Li gas with equal populations in the three lowest energy hyperfine states. This three-state Fermi gas is stable against two-body inelastic collisions but decays by three-body recombination. We measure the rate of three-body recombination which can be used as a signature of the Efimov effect and which determines whether conditions are favorable for BCS pairing. The three pairwise $s$-wave scattering lengths exhibit overlapping Feshbach resonances at 690, 810 and 834 Gauss. As we vary the field between 0 and 834 Gauss, we find that the three-body recombination rate constant varies by over four orders of magnitude. High stability is achieved near 0 and 570 Gauss. We observe narrow resonant loss features near 130 and 500 Gauss. Recent calculations indicate that these resonant features arise from Efimov trimer states near threshold [1,2]. We also report on the rate of three-body recombination between 834 and 2000 Gauss. Our determination of the three-body parameters in this regime will guide future experiments aimed at achieving color superconductivity in this system.

[1] E. Braaten, H.-W. Hammer, D. Kang, & L. Platter, arXiv:0806.0587.
[2] P. Naidon & M. Ueda, arXiv:0811.4086.

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