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Superconducting properties and the Fermi surface in noncentrosymmetric $CeRhSi_3$ T. TERASHIMA, T. YAMAGUCHI, T. MATSUMOTO, S. UJI, National Institute for Materials Science, N. KIMURA, T. KOMATSUBARA, H. AOKI, Tohoku University, H. HARIMA, Kobe University — $CeRhSi_3$ is a recently-discovered noncentrosymmetric superconductor [Kimura *et al.*, PRL **95**, 247004 (2005)]. At ambient pressure P, it orders antiferromagnetically below T_N = 1.6 K. T_N decreases with P above ∼8 kbar, and disappears somewhere above 20 kbar. Superconductivity is observed above ∼12 kbar. We have performed measurements of ac susceptibility and the de Haas-van Alphen effect (dHvA) with the field in the c direction up to P = 29.5 kbar. Remarkably high upper critical fields B_{c2} are observed: e.g., B_{c2} = 17.5 T at 0.46 K for P =29.5 kbar, where the superconducting transition temperature is only 1.1 K. The Fermi surface continuously evolves from P = 0 to 29.5 kbar, and the effective masses decrease with P. We argue that these are consistent with theoretical scenarios ascribing antiferromagnetism to spin-density-wave formation. Analyses of dHvA oscillations in the mixed state seem to suggest an anisotropic superconducting energy gap.

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