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Excess Magnetic Susceptibility Arising from Self damage in Alpha-Pu SCOTT MCCALL, MICHAEL FLUSS, BRANDON CHUNG, GEORGE CHAPLINE, MICHAEL MCELFRESH, DAMON JACKSON, Lawrence Livermore National Laboratory — The $f-$electrons of plutonium are delicately poised on the edge between localized and itinerant behavior. In the case of $\alpha-$Pu, the electrons are nearly localized in a narrow $f-$band and the Pauli magnetic susceptibility is the largest of any element. Low temperature magnetic susceptibility measurements on $\alpha-$Pu show that the magnetic susceptibility increases as a function of time, yet upon annealing the specimen at 350K, it returns to its initial value. This suggests that the excess magnetic susceptibility, $\chi_{xs}(t,T)$, arises from the α-decay and U recoil damage cascades which produce vacancy and interstitials as point and extended defects. The time dependence of χ_{xs} is well described by $\chi_{xs} \sim a(1-exp(-t/\tau))$ where a and τ are both functions of temperature. At short times, $\chi_{xs}(T<30)$, may be fit to a Curie-Weiss law. However, as $t \rightarrow \infty$, $\chi_{xs}(T<30) \rightarrow T^{-1}$ implying that self-damage may drive Pu towards non-Fermi liquid behavior. *This work was performed under the auspices of the U. S. DOE by Lawrence Livermore National Laboratory, under contract W-7405-Eng-48.*

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