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Measurement of Spin Susceptibility of Thin Films and Nano-Scale Structures JULIE BERT, HENDRIK BLUHM, NICHOLAS KOSHNICK, Stanford University, MARTIN HUBER, University of Colorado Denver, KATHRYN MOLER, Stanford University — We report measurements of a spin-like paramagnetic susceptibility signal from high purity metallic and insulating thin films. The measurements were performed using a Superconducting Quantum Interference Device (SQUID) in a scanning microscope. By using the SQUID to scan areas of the sample both near and far from the metallic films, we found a paramagnetic susceptibility associated with both Au and AlOx films that was ten times larger than could be explained by the concentration of impurity spins expected for 6N gold. The 1/T temperature dependence and the paramagnetic sign indicate that the susceptibility signal is caused by localized spins that are at most weakly coupled to each other and to the conduction electrons. Moreover, the signal exhibits a measurable out of phase response which can be related to 1/f noise due to fluctuating spins [Koch, DiVincenzo, and Clarke, Phys. Rev. Lett. **98**, 267003 (2007)]. These results demonstrate the utility of scanning SQUID based susceptibility measurements for characterizing spin related effects. Further applications of this technique may include probing 1/f noise origins in superconducting devices as well as imaging magnetic structures such as nanomagnets.

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