Abstract Submitted
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Microscopic model of the Knight shift in anisotropic and correlated metals[1] RICHARD KLEMM, BIANCA HALL, University of Central Florida — We present a microscopic model of nuclear magnetic resonance in metals. The spins of the spin-1/2 local nucleus and its surrounding orbital electrons interact with the arbitrary constant $\mathbf{B}_0$ and perpendicular time-oscillatory magnetic inductions $\mathbf{B}_1(t)$ and with each other via an anisotropic hyperfine interaction. An Anderson-like Hamiltonian describes the excitations of the relevant occupied local orbital electrons into the conduction bands, each band described by an anisotropic effective mass with corresponding Landau orbits and an anisotropic spin $\mathbf{g}$ tensor. Local orbital electron correlation effects are included using the mean-field decoupling procedure of Lacroix. The Knight resonance frequency and corresponding linewidth shifts are evaluated to leading orders in the hyperfine and Anderson excitation interactions. While respectively proportional to $(B_1/B_0)^2$ and a constant for weak $B_0 >> B_1$, both highly anisotropic shifts depend strongly upon $\mathbf{B}_0$ when a Landau level is near the Fermi energy. Electron correlations affect the anisotropy of the linewidth shift.

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