N1. Volume Dependence of the NMR in Ferromagnetic Cobalt.* R. V. Jones and I. P. Kaminow,† Harvard University.—The NMR frequency of Co\textsuperscript{99} in cubic cobalt metallic powder has been observed as a function of hydrostatic pressure to 6000 kg/cm\textsuperscript{2}. At 296°K the pressure shift is found to be quite linear over this range and can be represented as \(\frac{\partial \ln \nu}{\partial P} = 6.01 \pm 0.01 \times 10^{-9} \text{kg/cm}^2\). At 195°K the pressure shift is within 3% of this same value. From estimates of the volume compressibility of cubic cobalt the volume dependence of the resonance frequency is given by \(\frac{\partial \ln \nu}{\partial \ln V} = -1.19 \pm 0.06\). Marshall\textsuperscript{6} has given theoretical estimates of the various contributions to the magnetic field at the cobalt nucleus in hexagonal cobalt. Following Portis and Gossard\textsuperscript{7} adaptation of this model to the case of cubic cobalt and using previous experimental data, where available, we have tried to infer the main source of the volume dependence of the resonance frequency. It is felt that the main contribution arises from a decrease in the admixture of \(\delta\) wave functions into the \(3d\) band with decreasing lattice constant.

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† Bell Telephone Laboratories CDTP Fellow.

\textsuperscript{7} J. L. Walker has solved a special case (to be submitted to J. Appl. Phys.).

RAB. Observation of Ferrimagnetic Resonance in YIG as a Function of Large Hydrostatic Pressure.* I. P. Kaminow,† William Paul, and R. V. Jones, Harvard University.—Recently it has been shown that the magnetocrystalline anisotropy of ferromagnetic insulators can be attributed to the crystalline electric field at the magnetic ion. The application of hydrostatic pressure to a cubic crystal reduces the lattice constant without destroying the symmetry. In this way, it is expected that one can vary the crystalline field parameters and, consequently, the cubic anisotropy. Ferrimagnetic resonance experiments on yttrium iron garnet indicate that \(K_1/M\) increases approximately 30% when \(K_1/M\) decreases 90% and \(g_{\text{eff}}\) increases 1% at a pressure of 10 000 atm. These changes are nonlinear functions of pressure with the largest change occurring below 2000 atm. Bridgman's data for similar oxide crystals (mineral garnet and magnetite) indicate a volume reduction of 0.6% in 10 000 atm with only small deviations from linearity. The mechanism for these large pressure shifts is not understood. In fact, the magnitude of the cubic field "a" term for ions in S states (such as Fe\textsuperscript{3+}) is itself a mystery. In addition, to a variation in the crystalline field with pressure, the shift could be associated with changes of spin-orbit coupling, exchange interaction, or ionic arrangement in the unit cell.

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