an average would seem to be largely valid for distributions if not for end-point energies.

In view of the great difficulty of measuring the beta-spectrum of H^3, the concordance of adjusted data is remarkable. In terms of average deviations from the mean, it appears that the shape of the distribution function is now known to a precision of about 3 percent from 0.5 to 5.5 kev, about 1 percent from 6 to 11 kev, about 5 percent from 11.5 to 17.5 kev, and about 25 percent on up to within 2 percent of the end-point energy. Equally remarkable is the fact that the deviations of the composite from the theoretical spectrum are generally comparable with (in most cases less than) the corresponding average deviations of the measurements, except at the very lowest and highest energies where the measurements are very uncertain. A Fermi plot of the points in Figs. 1 and 2 is extremely satisfying from 2.5 to 18 kev; although the point at 0.9 kev is somewhat low, the points at 1.8 kev and above 18 kev are high (this last one about 100 percent).

[*] Foothill Laboratory, Pasadena, California.

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Natural Ferromagnetic Resonance

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WHILE studying the magnetic properties of a number of magnesium ferrites, and related spinels, evidence was obtained in a few cases of a resonance with sufficiently small damping to produce a peak in the curve of permeability *versus* frequency for unmagnetized samples. Figure 1 shows the results found for a particular magnesium ferrite. In the region where the resonance occurred, the measurements were carried out in terms of standing-wave observations in a coaxial line containing the sample adjacent to the short-circuited end. Care was taken that higher modes, which might propagate within the sample, were not excited. The results may be interpreted in terms of an extension of the Landau-Lifshitz theory[1] as amended by Kittel.[2] It may be deduced from Kittel's formula,

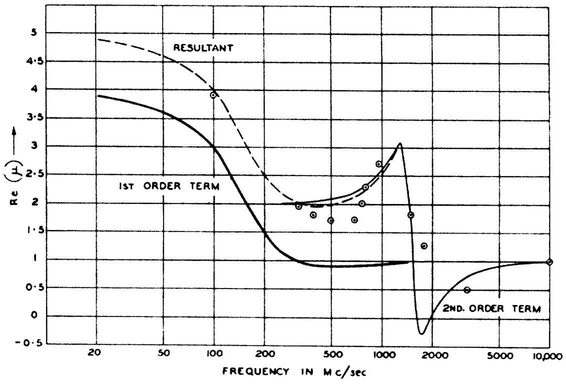

FIG. 1. Natural ferromagnetic resonance. ⊙ ⊙ ⊙ are points measured on Mg ferrite sample.

$$\frac{\chi}{\chi_0}=\frac{\omega_0^2+\lambda^2\mu_0+j\omega\lambda}{\omega_0^2+\lambda^2\mu_0-\omega^2+j\omega\lambda(1+\mu_0)}$$

that the real part of χ, $Re(\chi)$, can only be become negative if $\lambda<\omega_0$ but that it can exceed its static value χ_0 only if $\lambda<\omega_0/\mu_0$. Now, in fact, it has been found that all ferrites which are appreciably ferromagnetic show negative values of $Re(\chi)$ over some part of the range 1000 Mc/sec. to 10,000 Mc/sec., but hitherto none has been found with the positive peak in $Re(\chi)$. Where the positive peak has occurred in our results it has been superimposed upon a basic curve of falling χ, as seen from Fig. 1. The complete susceptibility can thus be regarded to a second approximation as the sum of two parts, each part represented by an equation of the above form. In the example given, the basic part contributes about three-fourths of the total low frequency susceptibility, has a resonance frequency, $\omega_0/2\pi$, of about 140 Mc/sec., and a damping ratio λ/ω_0 of about 0.5; the remaining one-fourth of the *LF* susceptibility has a resonance frequency of about 1500 Mc/sec. and a damping ratio of about 0.1. The observed shape of this resonance, however, appears to be much less sharp than that required by the formula; the addition of a third component enables a better fit to be obtained.

If Frenkel's form[3] of the absorption is used in place of Kittel's, the general frequency behavior is similar, but $Re(\chi)$ is then negative for $\omega>\omega_0$ for all values of the relaxation time τ, while $Re(\chi)/\chi_0$ exceeds unity at some frequency only if $\tau>\pi/\omega_0$. A slightly better fit to the observed points is obtainable with two components of Frenkel's form than of Kittel's, and the relaxation time for both components is near 10^{-9} sec.

At low frequencies the formula gives a loss component which varies with frequency in the same way as an eddy current loss, and it has been found that the measured apparent eddy current loss of several ferrites is of the order of magnitude predicted by the formula from high frequency measurements.

It has also been observed that the application of a sufficiently strong transverse static magnetic field restores the 10,000 Mc/sec. susceptibility to about one-fourth the *LF* value. This suggests that the first term (which is dominant at low frequencies) is insensitive to external fields, whereas the second term behaves as implied in Kittel's analysis, i.e., ω_0 increases with increase of the static field.

The interpretation of the two resonance frequencies in terms of internal fields would seem to imply rather smaller fields than have hitherto been suggested but the precise magnitudes involved would seem to depend considerably on the geometry assumed for them.

Acknowledgment is made to the Chief Scientist of the Ministry of Supply and to the Engineer-in-Chief of the General Post Office for permission to make use of the information contained in this letter.

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Beta-Spectrum and Decay Scheme of $_{65}Tb^{160}$

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THE β-spectrum of Tb^{160} has been investigated in the Argonne 180° spectrometer. The purified sample of Tb_4O_7 from Oak Ridge was bombarded in the Argonne heavy water pile for about 90 days and allowed to cool for about one month. The activity of a portion of the sample was then followed for ~3 months indicating a half-life of 71±1 day.

The source of ~0.1 mg/cm² was prepared on a Nylon backing