HYPERFINE FIELD STUDIES IN METALS AND ALLOYS

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Extensive measurements of the hyperfine magnetic field (hmf) in Heusler alloys, their temperature dependence and their sign have been made using ^{111}In and ^{99}Rh probes. The TDPAC results have been published in the J. of Applied Physics (1981). Mossbauer measurements of the hmf at the ^{119}Sn site in some Heusler alloys were reported in the Journal de Physique (1981). The remaining set of data has been communicated for publication in two additional papers: HMF in Cu_2MnY, Heusler Alloys and TDPAC and Mossbauer Studies of the Heusler Alloys Ni_2MnY. In addition, further studies of the hmf in Chromium based chalcogenide spinels using ^{99}Rh, ^{111}In and ^{119}Sn have been made and the results have been published in Hyperfine Interaction V (North Holland Publishing Co., 1981).

Recent results have included the measurement of the hmf at ^{111}Cd in spin glasses CuMn (3 atomic %) and AgMu (3 atomic %) at 1.5°K. The Heusler alloys Cu_2MnY and Ni_2MnY have been studied using ^{111}In which occupies the Y site and with ^{111}Ag which occupies the Cu and Ni sites. Earlier measurements by ^{111}Cd established the dependence of the hmf on the sites in the alloys. The introduction of dilute ^{99}Rh (less than 1% impurity) in Ni_2MnGa alloy has opened up a new area of study of the hmf dependence on the probe. In Fig. 1 is shown the measurement of the hmf at ^{99}Ru site in $CuCr^{99}RhSe_4$. The hmf of 10^6 Gauss is the highest field found for the Ru probe in a ferromagnetic host, including Fe.

Future plans include studies of the Heusler alloys X_2MnY and XMnY with Ru and Rh probes at the X-sites to test whether the hmf scales with the hyperfine coupling constant. In addition, we intend to pursue the studies of $CuCr^{99}RhSe_4$ to verify if the hmf is really 10^6 Gauss.

Finally, we would like to continue our studies of the hmf of spin glass materials AgMn and CuMn as a function of both Mn concentration and temperature in the range 1.5-4.2°K. Hopefully, this information may shed new light on the freezing phenomena and enable us to study the AFM → FM phase transition and possible spin-glass transitions in RhFe alloys.

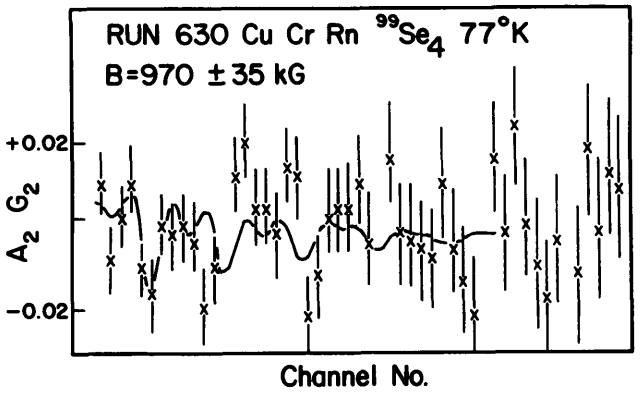

Figure 1. The hmf of a million Gauss is the highest field found for the Ru probe in a ferromagnetic host, including iron.