IV. LOW TEMPERATURE PHYSICS

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A. MEASUREMENT OF THE THERMODYNAMIC EQUATION OF STATE OF PARAMAGNETIC SALTS

As we noted in the Quarterly Progress Report of January 15, 1955, our measurements of the entropy of potassium chromium alum in the adiabatic demagnetization region of temperature gave values which did not agree with those of previous workers. We determined the entropy by comparing the magnetization at large fields (measured along an adiabat) with the corresponding magnetization for an ideal paramagnetic salt. Previous workers used the method of computing the entropy before demagnetization; we therefore desired to check our equipment by applying their method to the determination of the entropy. Within the experimental accuracy, our measurements agreed with those of the previous workers (see Fig. IV-2, p. 17, in the January report).

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B. MAGNETO-RESISTANCE AND HALL EFFECT IN MAGNESIUM AT LOW TEMPERATURES

Several runs were made in which the magneto-resistance of a sample of magnesium containing 0.12 per cent manganese was measured. This sample is one which shows a marked minimum in its dependence of resistance on temperature. The magneto-resistance is positive in the liquid helium region; it amounts to approximately 0.5 per cent at 2000 gauss. The dependence on field is solely, or almost solely, quadratic.

We have also made some measurements on a sample containing 0.29 per cent manganese, which also shows a marked resistance minimum. In this case, partly because of the limitations of the experimental technique, and partly because of the small magnitude of the magneto-resistance (less than 0.1 per cent at 2000 gauss), our measurements are imprecise. The magneto-resistance apparently becomes negative near 2.5°K. Since the behavior of the magneto-resistance in this region is of considerable interest, we plan to modify the apparatus to operate at a higher frequency, where the sensitivity should be much improved.

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