



FIG. 5. Dependence of the threshold field  $H_{th}$  on the pressure. Room temperature.

Figure 5 shows the variation of the value of  $H_{th}$  as a function of the pressure, as determined from the curves of Fig. 4, from which it is seen that  $H_{th}$  decreases linearly with increasing pressure. Repeated measurements have shown good reproducibility of these data, so that the variation of  $H_{th}$  under the influence of hydrostatic compression can be given by

$$dH_{th}/dP = -0.67 \pm 0.07 \text{ Oe} \cdot \text{cm}^2/\text{kg}.$$

The data we obtained on the variation of the threshold field with pressure are in qualitative agreement with the results of an investigation of the magnetization of  $\text{MnAu}_2$  under hydrostatic compression up to  $4500 \text{ kg/cm}^2$ , carried out by Klitzing and Gielessen<sup>[6]</sup>, who have shown that the hydrostatic compression increases the slope of the magnetization curve and simultaneously shifts the start of the rise in the  $\sigma = f(H)$  curves toward smaller magnetic fields. On the basis of the data we obtained it can be assumed that the increase in the magnetization observed in<sup>[6]</sup>, amounting to a factor of  $2\frac{1}{2}$  at a pressure of  $4600 \text{ kg/cm}^2$ , is apparently connected essentially with the strong decrease in the threshold field under the action of the hydrostatic compression of the specimen.

3. Using for  $\text{MnAu}_2$  a compressibility  $\kappa = 6 \times 10^{-7} \text{ cm}^2/\text{kg}$  and a thermal coefficient of volume expansion  $\alpha = 6.55 \times 10 \text{ deg}^{-1}$ <sup>[7]</sup>, we can easily verify that a pressure of  $10,000 \text{ kg/cm}^2$  is equivalent (in the sense of the change in distance between atoms) to a change in temperature by  $92^\circ$ . If the change in the threshold field  $\text{MnAu}_2$  is due only to the change in the parameters of the crystal cell, then we can expect  $H_{th}$  to drop to  $700 \text{ Oe}$  at  $T = 200^\circ\text{K}$ , which corresponds to the value of  $H_{th}$  at  $P = 10,000 \text{ kg/cm}^2$ . However, the temperature dependence of the threshold field, which we determined on the basis of the measurements of the isotherms of the magnetization of  $\text{MnAu}_2$  in the temperature range  $86-310^\circ\text{K}$ , shows that when the temperature drops  $H_{th}$  does not decrease, but in-

creases somewhat. Thus, for example, at  $T = 77^\circ\text{K}$ , we have  $H_{th} = 10,000 \text{ Oe}$ , and at  $T = 200^\circ\text{K}$  it amounts to  $H_{th} = 9400 \text{ Oe}$ .

4. Taking into account the helicoidal magnetic structure of  $\text{MnAu}_2$ , the variation of  $T_N$  and  $H_{th}$  with pressure as observed by us can be explained in the following manner. If we assume that  $T_N$  is determined by the largest of the exchange interactions existing in this crystal, then we can assume that the decrease in the distance between the manganese atoms that lie in the basal planes and are nearest neighbors leads to an increase in the positive interaction, for  $T_N$  increases with increasing pressure. At the same time, the decrease in distance between basal planes brought about by the pressure, that is, between every other plane, leads to an attenuation of the negative interactions, the values of which depend very strongly on the distance. According to Herpin, Meriel, and Villain<sup>[4]</sup>, the interaction between the manganese atoms lying in neighboring basal planes is the sum of two interactions, one positive between the atoms of the neighboring layers, and one negative between the atoms of every other layer.

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