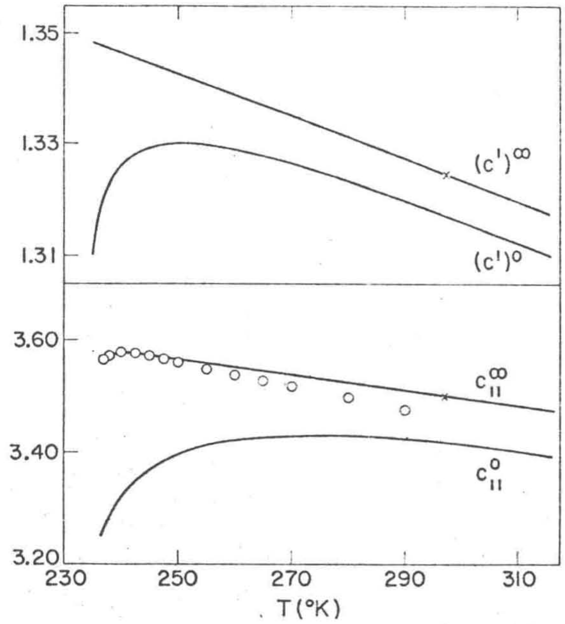

FIG. 5. Variation of the limiting values of c_{11} and c'. The smooth curves for c_{11}^0 and c'^0 are taken from Ref. 4. The crosses are infinite-frequency elastic constants reported in Ref. 5; see text for a discussion of the choice of the c_{11}^{∞} and c'^{∞} smooth curves. Note that the vertical scale for c' is 10 times larger than that for c_{11}.

a function of temperature at ~ 16 GHz,[5] and the elastic stiffness corresponding to this wave is $c_L = c_{11} - c' + c_{44}$. The open circles shown in Fig. 5 represent c_{11} values calculated from $c_{11} = c_L(16\text{ GHz}) + c'^{\infty} - c_{44}^{\infty}$. (Since there is no dispersion for the [100] shear wave, c_{44}^{∞} can be replaced by the known c_{44}^{0}.) Near the transition these c_{11} values should correspond to c_{11}^{∞} since the relaxation times becomes very long. The c_{11}^{∞} values between 242.5 and 297 °K were obtained by linear interpolation (see Fig. 5). Uncertainties in c_{11}^{∞} due to ambiguities in the c'^{∞} values are less than 1%, which would correspond to less than a 10% possible systematic error in the relaxation strength for the c_{11} wave.

The values of the relaxation strength C calculated at various temperatures from the smooth-curve values of c^{∞} and c^0 are shown in Fig. 6, where $1/C$ is plotted versus $\Delta T = T - T_{\lambda}$. The relaxation strength for the c_{11} wave in NH_4Cl at 1 atm is also shown for comparison. This empirical plot indicates that $1/C$ varies linearly with ΔT for the [100] longitudinal wave in both NH_4Cl and NH_4Br. Indeed, this linear variation extends out to $\Delta T = 50$ for NH_4Cl.[3] The inverse relaxation strength for the longitudinal wave can be represented in the form

$$C^{-1}(\epsilon) = C^{-1}(0) + b\epsilon^m , \tag{6}$$

where ϵ is the reduced temperature and m is an empirical exponent equal to 1 at 1 atm. The parameters $C^{-1}(0)$ and b are, respectively, 6.4 and 120 (in units of 10^6 cm sec^{-1}) for NH_4Br; the

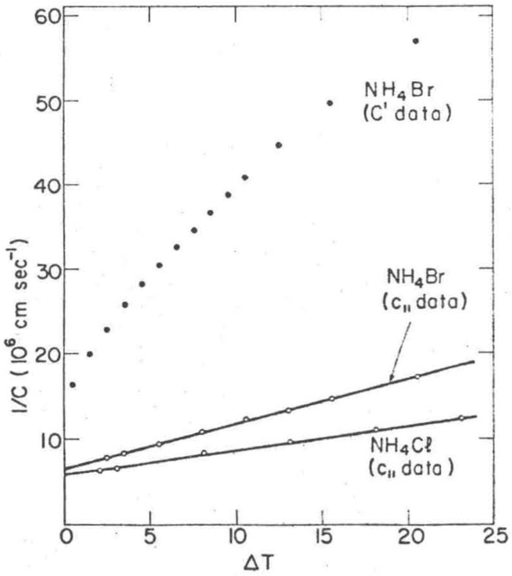

FIG. 6. Inverse relaxation strengths as a function of $\Delta T = T - T_{\lambda}$ (in °K). The results for NH_4Cl are taken from Ref. 3.

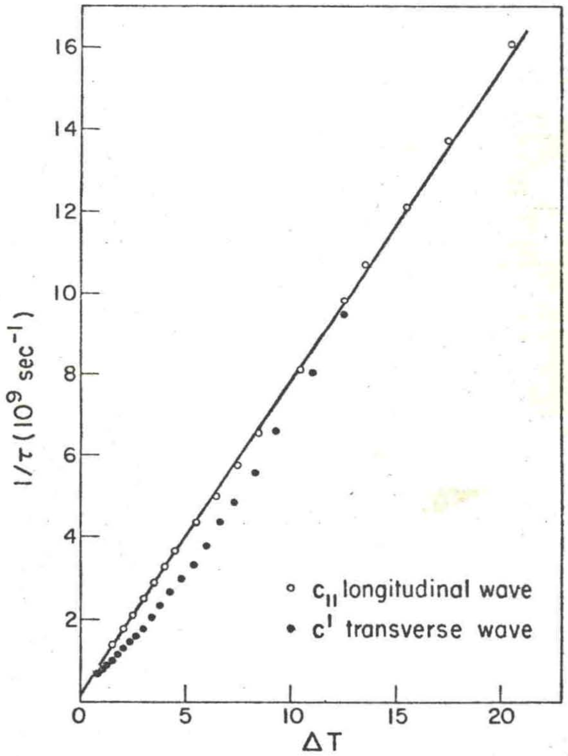

FIG. 7. Inverse relaxation times for the [100] longitudinal wave and the [110] transverse wave as a function of ΔT (in °K).