high pressure and high field data. The $(\Delta_1 - L_1)$ sub-band energy gap is $0{\cdot}186 \pm 0{\cdot}010$ eV. The scattering parameters defined by Nathan *et al.* (1961) are estimated to be $S = 4 \pm 1$, $S' = 0{\cdot}30 \pm 0{\cdot}15$. This is excellent support for their original work which used only resistivity data to 27 kbar. The Hall mobility through band cross-over has been measured directly for the first time. Figure 7 illustrates how the mobility near band cross-over at 30 kbar is drastically reduced compared with theoretical calculations which assume no nonequivalent intervalley scattering. The ⟨100⟩ Hall mobility in pure n type Ge is $1020 \pm 170\ \mathrm{cm}^{-2}\ \mathrm{V}^{-1}\ \mathrm{s}^{-1}$ at room temperature and atmospheric pressure.

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Appendix. Considerations of relaxation times

The normal expression is from equation (4)

$$\langle \tau_x^n(E) \rangle = \frac{4}{3\pi^{1/2}} \int_0^\infty \tau_x^n(y)\, y^{3/2} \exp(-y)\, \mathrm{d}y \qquad y = E/kT$$

Now

$$\langle \tau_g(\infty) \rangle = \frac{4}{3\pi^{1/2}} \int_0^\infty \frac{E^{-1/2}}{A_g C_g'(kT)^{5/2}} E^{3/2} \exp(-E/kT)\, \mathrm{d}E$$

and

$$\langle \tau_g^n(\infty) \rangle = \frac{4}{3\pi^{1/2}} \int_0^\infty \frac{E^{(3-n)/2}}{(A_g C_g')^n (kT)^{5/2}} \exp(-E/kT)\, \mathrm{d}E$$

$$= \frac{4}{3\pi^{1/2}} M_g^n \int_0^\infty y^{(3-n)/2} \exp(-y)\, \mathrm{d}y$$

where

$$M_g^n = \{A_g C_g'(kT)^{1/2}\}^{-n}.$$

Then

$$\langle \tau_g^n(\Delta E) \rangle = \frac{4}{3\pi^{1/2}} M_g^n \left\{ \int_0^{\Delta E} y^{(3-n)/2} \exp(-y)\, \mathrm{d}y + \int_{\Delta E}^\infty \frac{y^{(3-n)/2} \exp(-y)\, \mathrm{d}y}{\{1 + S(1 - \Delta E/y)^{1/2}\}^n} \right\}$$

and similarly for $\langle \tau_s^n(\infty) \rangle$ and $\langle \tau_s^n(\Delta E) \rangle$, where S' substitutes for S. When the s band becomes lower than the g then the subscripts are reversed.

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