

From Figs. 2 and 3 we see that the matrix elements for Raman scattering in the valence band are comparable (unlike in the conduction band) for InSb and InP, and this is because A_{f0} in the valence band is inversely proportional to only the first power of E_G .

(b) *Spin Reversal Transitions*

Somewhat arbitrarily, we denote by spin-reversal transitions in the valence band, those processes which involve one photon polarized parallel to H and one polarized transverse to H . This terminology agrees with that in the conduction band. Because of the opposite curvatures of the conduction and valence bands the transitions between holes have polarizations opposite to those of the transitions with the same Δn in the conduction band. The matrix elements are of order P^2/mE_G and can readily be obtained if needed.

III. CONCLUSION

The cross sections calculated above are sufficiently large to permit the observation of the Raman transi-

tions with a laser source. Thus for the $|hh,0\rangle$ to $|lh,1\rangle$ transition in InP, a differential cross-section of $(d\sigma/d\Omega) \sim 2 \times 10^{-23} \text{ cm}^2$ is given on Fig. 3. This can be compared with an observed⁵ total cross-section of $\sigma \sim 5 \times 10^{-24} \text{ cm}^2$ for F centers in alkali halides. An advantage of Raman spectroscopy is the large value of $\omega_c\tau$ which can be reached with a high magnetic field. For example the mobility⁶ at 77°K of p -type InP with 10^{16} impurities per cc corresponds to $\omega_c\tau \sim 7$ for the light holes at 100 kG. Thus for large (and of course, small) band gap materials the Raman transitions in the valence band as well as the spin-reversal transitions can be of use in band structure measurements.

ACKNOWLEDGMENT

The author is grateful to P. A. Wolff for suggesting some of these calculations and for several informative discussions.

⁵ J. M. Worlock and S. P. S. Porto, Phys. Rev. Letters **15**, 697 (1965); C. H. Henry, (to be published).

⁶ M. Glicksman and K. Weiser, J. Phys. Chem. Solids **10**, 337 (1959).

Erratum

Nuclear Quadrupole Resonance by Nuclear Induction: Theory and Experiment; with an Extension of the Theory to Absorption Methods, GEORGE W. SMITH [Phys. Rev. **149**, 346 (1966)]. C. Dean [Phys. Rev. **96**, 1053 (1954)] first predicted the applicability of the Bloch crossed-coil apparatus to NQR experiments.