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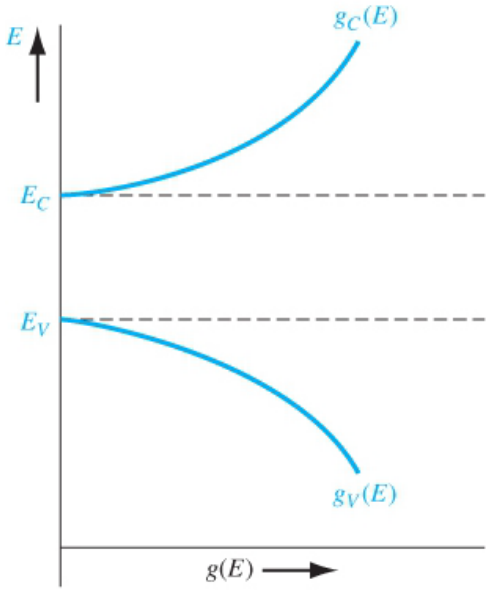


**Figure 3.27** | The density of energy states in the conduction band and the density of energy states in the valence band as a function of energy.

➢ Looking ahead to Chapter 4, Table 4.1 gives some typical values (@ 300 K?).

**Table 4.1** | Effective density of states function and density of states effective mass values

| | $N_c$ (cm$^{-3}$) | $N_v$ (cm$^{-3}$) | $m_n^*/m_0$ | $m_p^*/m_0$ |
|---|---|---|---|---|
| Silicon | $2.8 \times 10^{19}$ | $1.04 \times 10^{19}$ | 1.08 | 0.56 |
| Gallium arsenide | $4.7 \times 10^{17}$ | $7.0 \times 10^{18}$ | 0.067 | 0.48 |
| Germanium | $1.04 \times 10^{19}$ | $6.0 \times 10^{18}$ | 0.55 | 0.37 |

http://apachepersonal.miun.se/~gorthu/halvledare/Effective%20mass%20in%20semiconductors.htm

**Effective mass and energy bandgap of Ge, Si and GaAs**

| Name | Symbol | Germanium | Silicon | Gallium Arsenide |
|---|---|---|---|---|
| Smallest energy bandgap at 300 K | $E_g$ (eV) | 0.66 | 1.12 | 1.424 |
| **Effective mass for density of states calculations** | | | | |
| Electrons | $m_{e}^{*}{}_{,dos}/m_0$ | 0.56 | 1.08 | 0.067 |
| Holes | $m_{h}^{*}{}_{,dos}/m_0$ | 0.29 | 0.57/0.81[1] | 0.47 |
| **Effective mass for conductivity calculations** | | | | |
| Electrons | $m_{e}^{*}{}_{,cond}/m_0$ | 0.12 | 0.26 | 0.067 |
| Holes | $m_{h}^{*}{}_{,cond}/m_0$ | 0.21 | 0.36/0.386[1] | 0.34 |

[1] Due to the fact that the heavy hole band does not have a spherical symmetry there is a discrepancy between the actual effective mass for density of states and conductivity calculations (number on the right) and the calculated value (number on the left) which is based on spherical constant-energy surfaces. The actual constant-energy surfaces in the heavy hole band are "warped", resembling a cube with rounded corners and dented-in faces.