Fig. 1.1. Circuit diagram of a simple amplifier with feedback.

\[ V_0 = A_0(V_T + \beta V_0) \]
Fig. 1.2. Schematic diagram of a basic laser structure incorporating an amplifying medium and two feedback mirrors, \( M \).
Fig. 1.3. Simple schematic energy level diagram for a particle.

Energy

$E_i$  

Excited states  

$E_j$  

$E_k$  

$E_0$  

$\nu_j$ is the frequency of the emitted photon

$h\nu_j$  

The level with the lowest energy – $E_0$ is the ground state
Fig. 1.4. Schematic representation of spontaneous emission between two levels of energy $E_i$ and $E_j$. 
Fig. 1.5. A lineshape function $g(v_0, v)$. 

\[ g(v) \]
Fig. 1.6. Schematic representation of stimulated emission between two levels of energy $E_2$ and $E_1$. 

$E_2 - E_1 = h\nu_{12}$

$\nu_{12}$
Fig. 1.7. A volume of space swept through per second by part of a plane wave.
Fig. 1.8. A ‘white’ energy density spectrum.
Fig. 1.9. A monochromatic energy density spectrum.
Fig. 1.10. A generalized energy density spectrum.

Energy density $\rho(v)$

$\nu_1$  $\nu_2$  Frequency $v$
Fig. 1.11. Schematic representation of stimulated absorption between two levels of energy $E_1$ and $E_2$. 

$E_2$  

$N_2$  

$h\nu_{21}$  

$N_1$  

$E_1$
Fig. 1.12. A photon-particle 'collision' picture of the (a) stimulated emission and (b) absorption processes.
Fig. 1.13 Spectral distribution of black-body radiation at different temperatures.
Fig. 1.14. Simple model of a black-body absorber/emitter – an enclosed cavity containing a small hole.
Fig. 1.15. Allowed values of $k_x, k_y, k_z$ in k-space for a cubical cavity of side $L$. 
Fig. 1.16. The Rayleigh–Jeans prediction of the spectral intensity of a black body compared to the Planck formula.
Fig. 1.17. Radiative processes connecting two energy levels in thermal equilibrium at temperature $T$. 

\[
\begin{align*}
N_2 & \quad \text{Spontaneous emission} \\
\quad & \quad \text{Stimulated emission} \\
\quad & \quad \text{Absorption} \\
N_1 & \quad \text{E}_1 \quad \text{hv} \quad \text{E}_2
\end{align*}
\]
Fig. 1.18. Two energy levels, each of which has a number of sub-levels of the same energy.