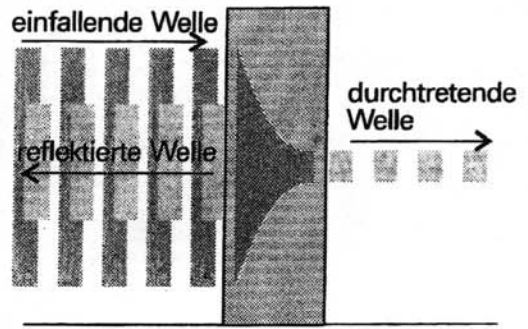Fig. 11.10 Interferences of electron waves

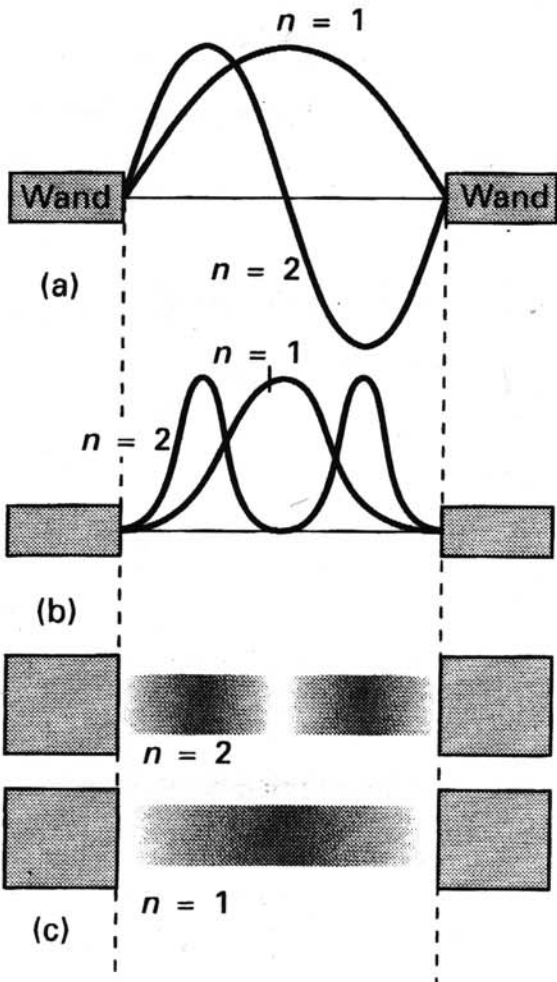Fig. 12.10 Tunneling and reflection of particles at a barrier

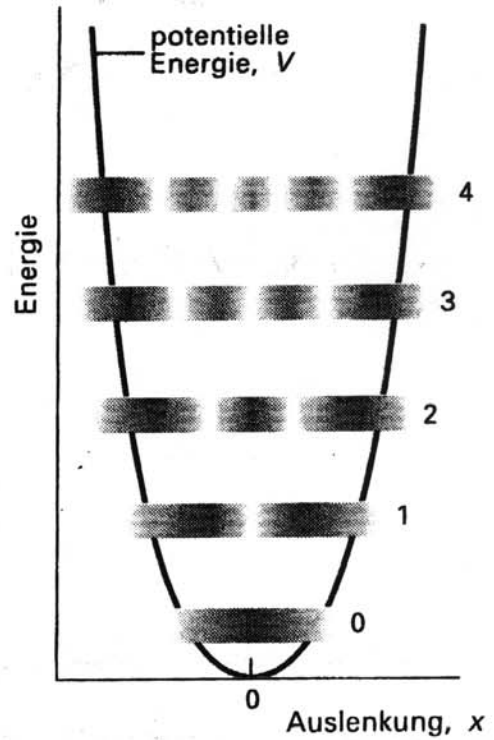Fig. 12.4 Two lowest states of electron in box

Fig. 12.13 Energies and distributions of a harmonic oscillator (diatomic molecule)
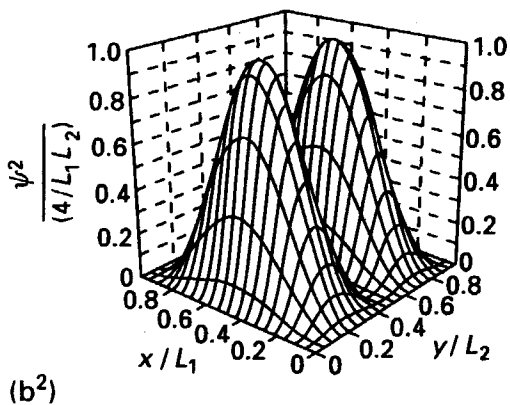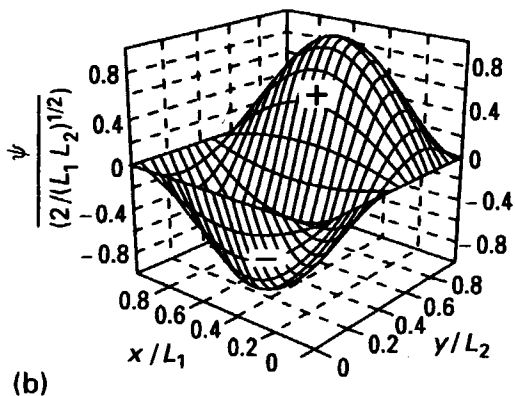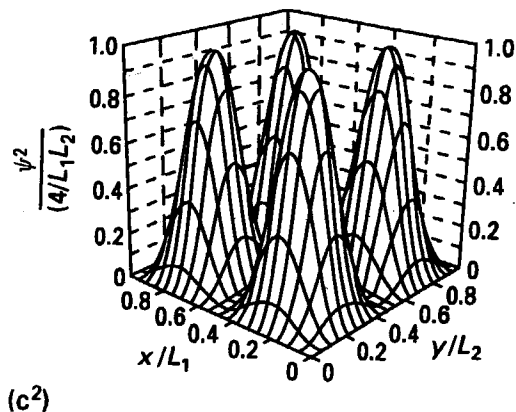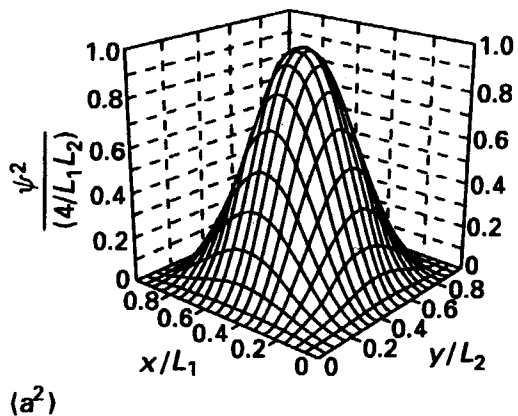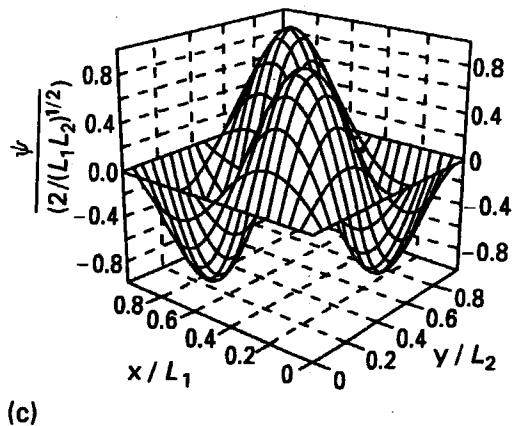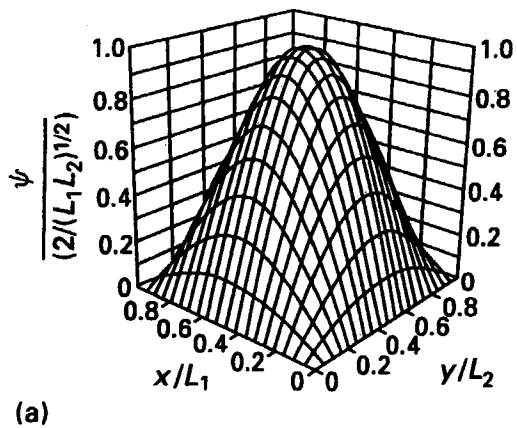
(a)

(a²)

(b)

(b²)

(c)

(c²)

Fig 12.7 Three different states (1,1), (1,2), (2,2) of an alectron in a rectangular box [L1, L2]
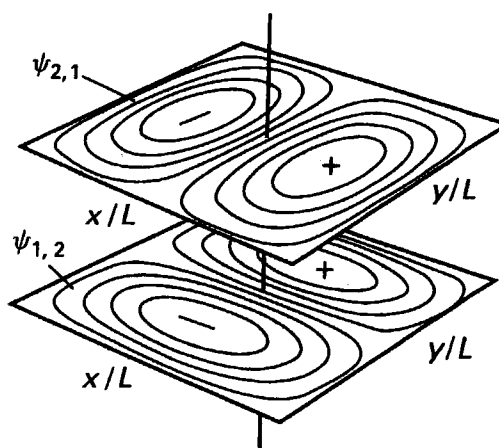
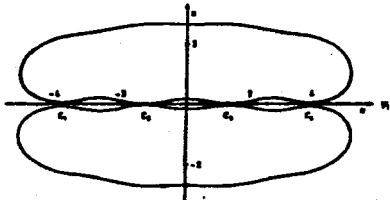*Fig. 12.8* So-called contour plot of states (1,2) and (2,1)
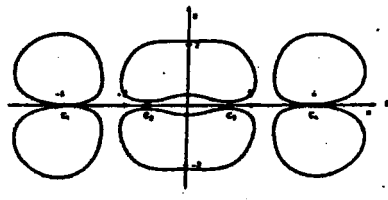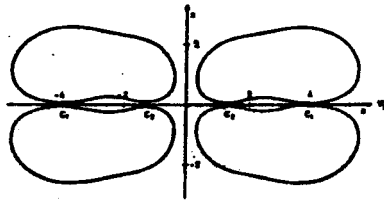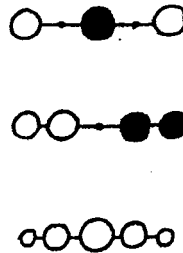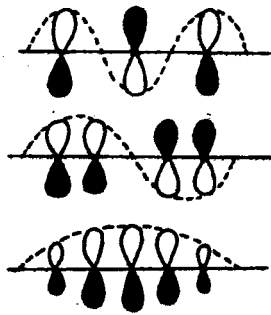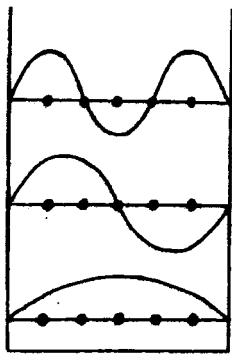
Elektronendichte im Butadien:

$C = C - C = C$

$\pi_z\,(112)$

$\pi_y\,(121)$

"σ–Zustände"

Symmetr. Cyanine

$(CH_3)_2\overline{N}-(CH=CH)_m-CH=\overset{\oplus}{N}(CH_3)_2$

Merocyanine

$(CH_3)_2\overline{N}-(CH=CH)_m-CH=O$

Polyene

$CH_3-(CH=CH)_{m+1}-CH_3$
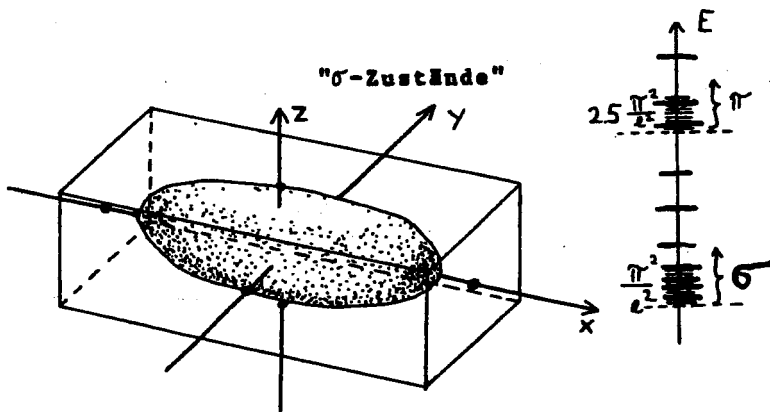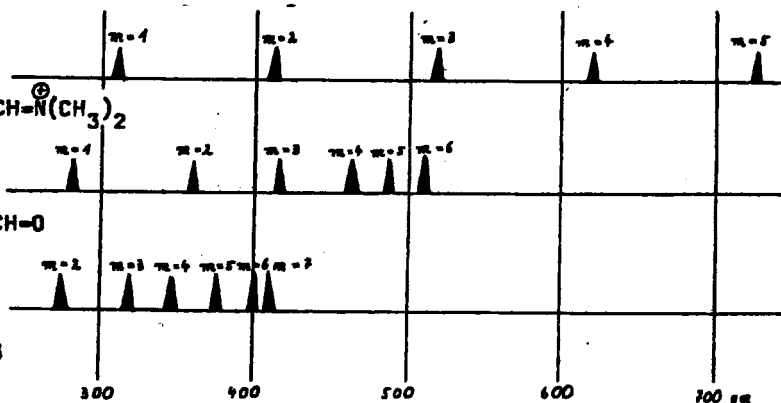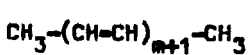
Tab. 12.3 Spherical harmonics

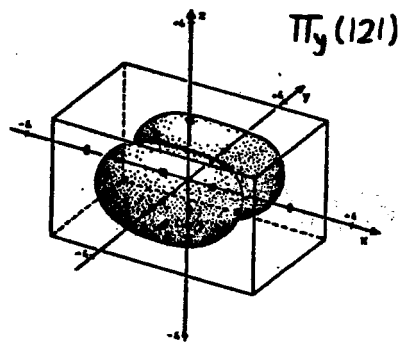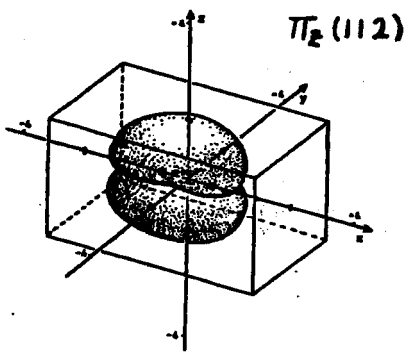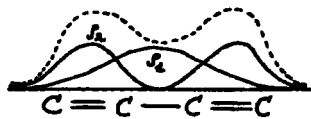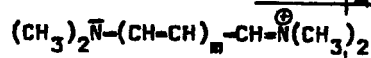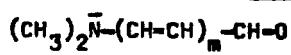| l	m_l	$Y_{l,m}$	$Z_{l,m}$
0	0	$\left(\dfrac{1}{4\pi}\right)^{1/2}$	1
1	0	$\left(\dfrac{3}{4\pi}\right)^{1/2}\cos\theta$	$\dfrac{z}{r}$
	± 1	$\pm\left(\dfrac{3}{8\pi}\right)^{1/2}\sin\theta\, e^{\pm i\phi}$	$\dfrac{x;y}{r}$
2	0	$\pm\left(\dfrac{5}{16\pi}\right)^{1/2}(3\cos^2\theta-1)$	$\dfrac{2z^2-x^2-y^2}{r^2}$
	± 1	$\pm\left(\dfrac{15}{8\pi}\right)^{1/2}\cos\theta\sin\theta\, e^{\pm i\phi}$	$\dfrac{xz;yz}{r^2}$
	± 2	$\pm\left(\dfrac{15}{8\pi}\right)^{1/2}\cos\theta\sin\theta\, e^{\pm i\phi}$	$\dfrac{x^2-y^2;xy}{r^2}$

$l = 0,\ m_l = 0$

$l = 1,\ m_l = 0$ $l = 1,\ |m_l| = 1$

$l = 2,\ m_l = 0$ $l = 2,\ |m_l| = 1$ $l = 2,\ |m_l| = 2$
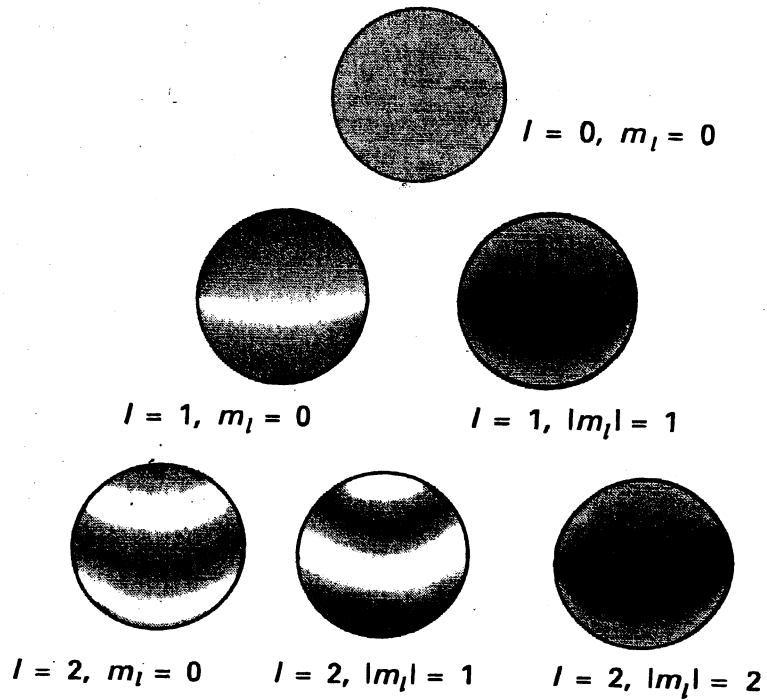
Fig. 12.25 Angular distribution of particles in s, p, d-states

$m_l = +2$ $m_l = +1$

$m_l = 0$

$m_l = -1$ $m_l = -2$
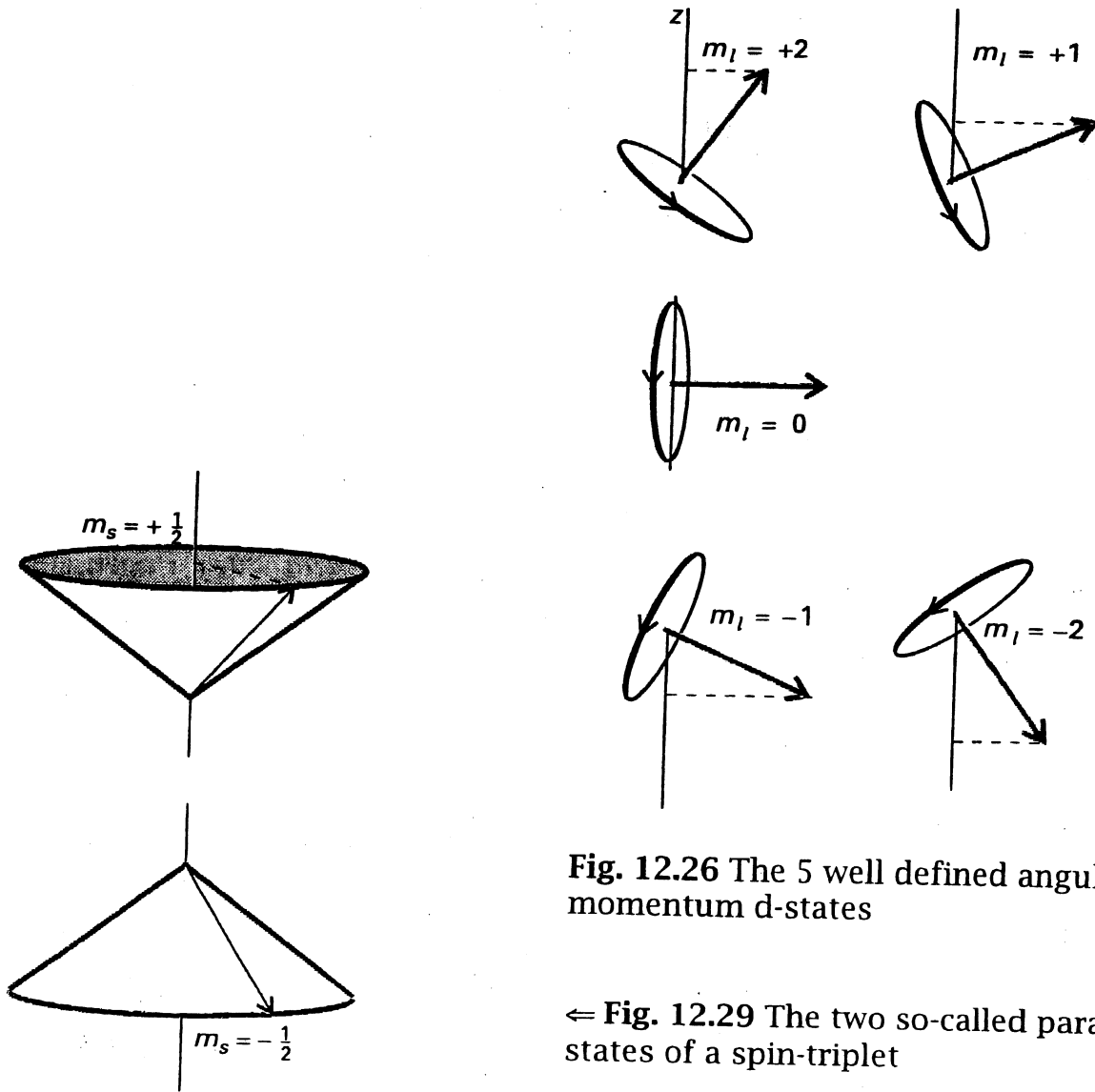
Fig. 12.26 The 5 well defined angular momentum d-states

$m_s = +\tfrac{1}{2}$

$m_s = -\tfrac{1}{2}$

⇐ **Fig. 12.29** The two so-called parallel states of a spin-triplet