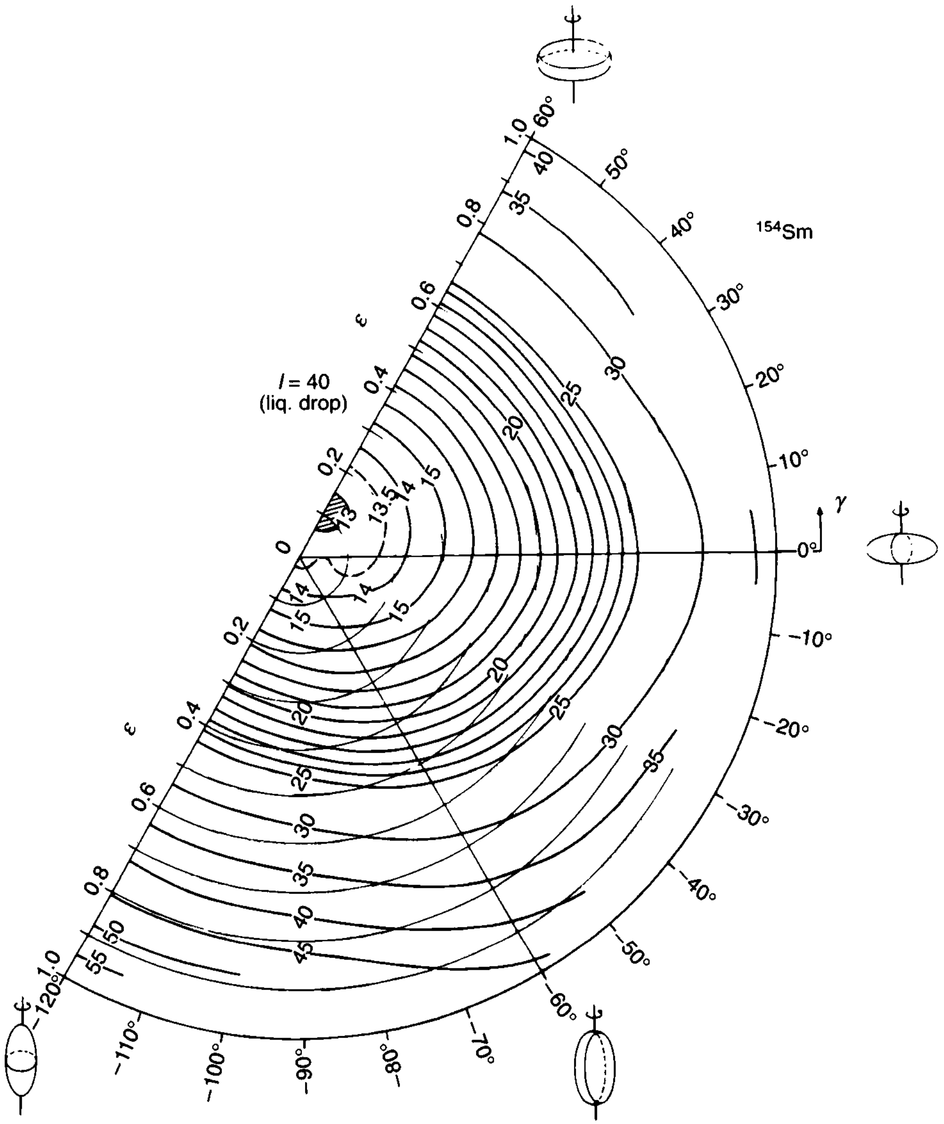

Fig. 12.2. Contour plot in the (ε, γ)-plane of the rotating liquid-drop energy calculated for the nucleus ^{154}Sm at $I = 40$. The rotation axis (defined as the 1-axis) is sketched for the different cases of axially symmetric shape (cf. fig. 8.6). The same nuclear shapes are formed in the three 60° sectors but the rotation axis coincides with the smaller ($\gamma = 0°$ to $60°$), the intermediate ($\gamma = 0°$ to $-60°$) and the larger ($\gamma = -60°$ to $-120°$) principal axis, respectively. The numbers on the contour lines refer to MeV above the energy of a spherical liquid drop at $I = 0$ (from Andersson *et al.* 1976).

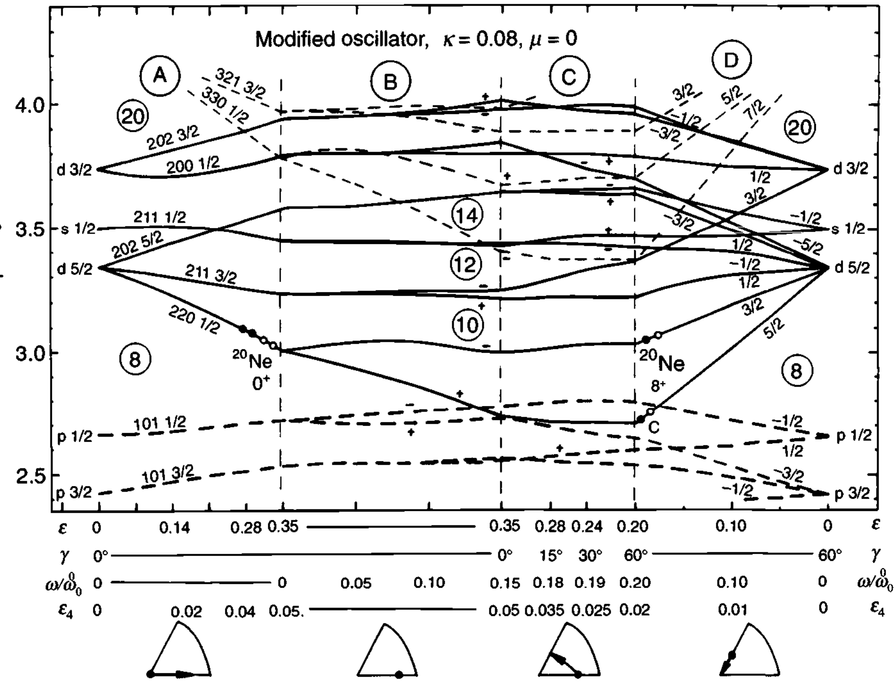

Fig. 12.4. Single-particle orbitals along a path in the $(\varepsilon, \varepsilon_4, \gamma, \omega)$ space as indicated schematically in the lower part of the figure. The path is chosen to illustrate how the orbitals can be followed when a prolate collective band goes to termination at oblate shape. The spherical origin of the orbitals at a typical low-spin deformation is traced in part A while in part B, rotation is switched on at constant deformation. At a frequency of $\omega/\mathring{\omega}_0 \simeq 0.15$ corresponding to $I \simeq 6$ in the ^{20}Ne ground band, the driving forces toward oblate shape become important. Thus, in part C the deformation is varied over the γ plane together with changes in the other parameters as they occur when a band approaches termination at $\gamma = 60°$. In part D, finally, the origin of the aligned oblate orbitals is traced, illustrating to which j shell they mainly belong and their aligned spin. The occupation of sd-shell orbitals in the ground state and in the terminating 8^+ state of ^{20}Ne is also indicated. It is interesting to note how the $Z = N = 10$ gap stays large all the way to the termination ($\varepsilon \simeq 0.20, \gamma = 60°$) while this is not the case for the $N = Z = 12$ gap. Thus, we expect the aligned 8^+ state terminating the ground band in ^{20}Ne to be more favoured than the corresponding aligned 12^+ state in ^{24}Mg (revised from Sheline *et al.*, 1988).

rotating harmonic oscillator. The present configuration of ^{20}Ne should thus be denoted as $\Sigma_\alpha = 14, \Sigma_\beta = 22$ (and $\Sigma_1 = 14$).

In the harmonic oscillator approximation, it is now trivial to calculate the properties of the ground state configuration of ^{20}Ne from the explicit formulae given above. The maximum spin of the configuration is $I_{\max} = 8$