

Addenda for lecture 5.

The connection between drums and the H_2 molecule

1. The lowest energy mode of a drum include the 1s, 2s and 2p orbitals (see prob. 7 Prob. Set 1)



— 2s

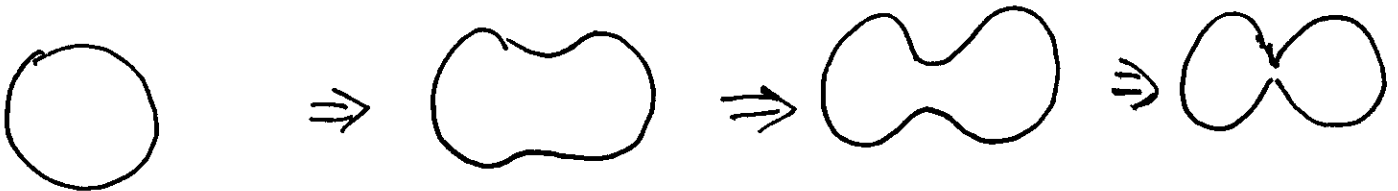
E↑ — — 2p



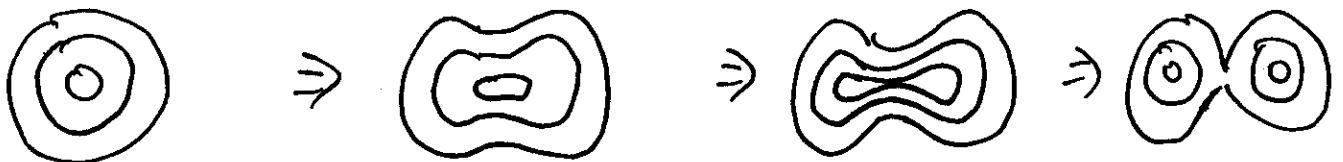
— 1s



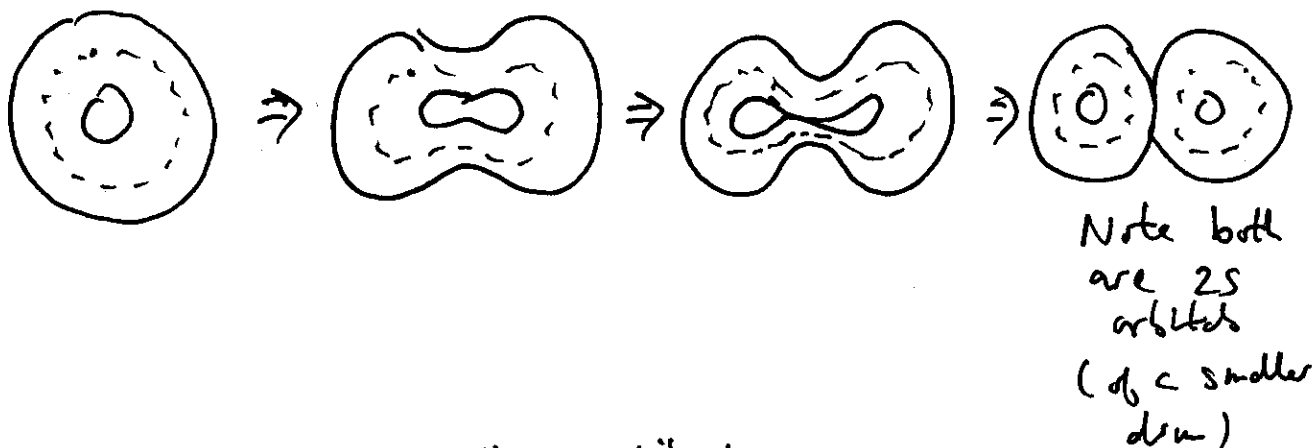
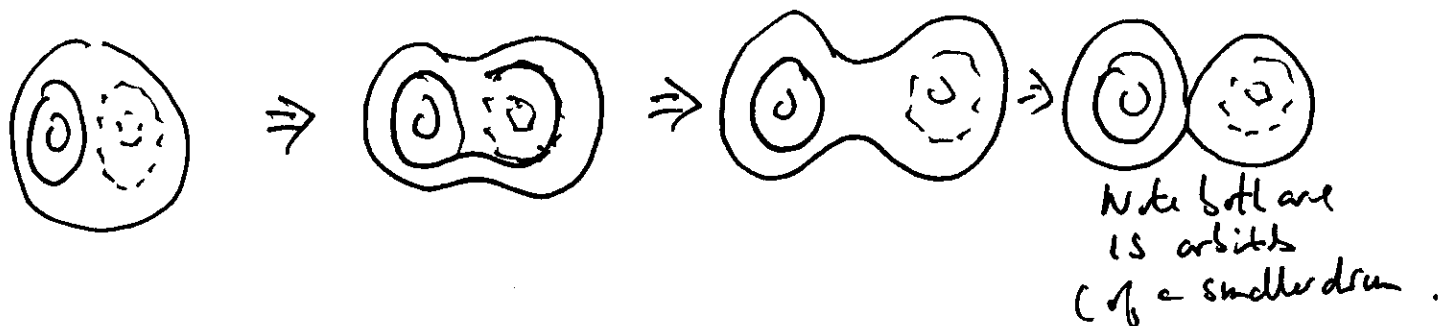
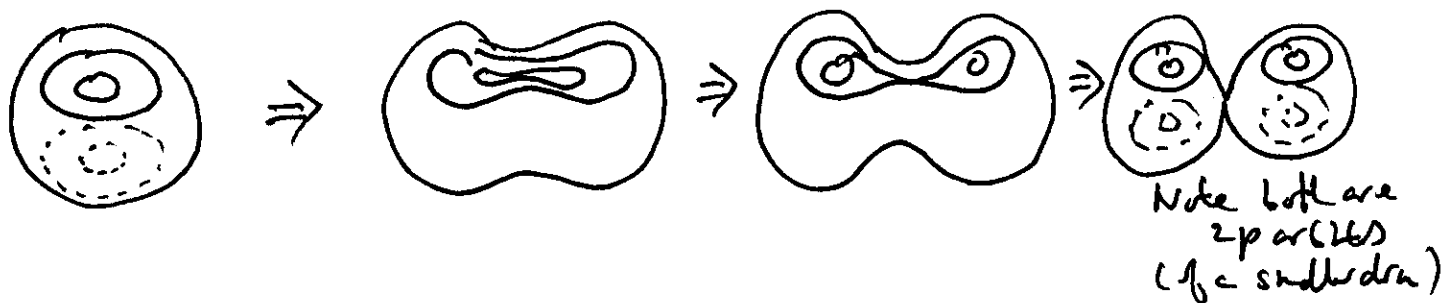
2. Now let us examine what happens to these drum modes as the shape of the drum is distorted:



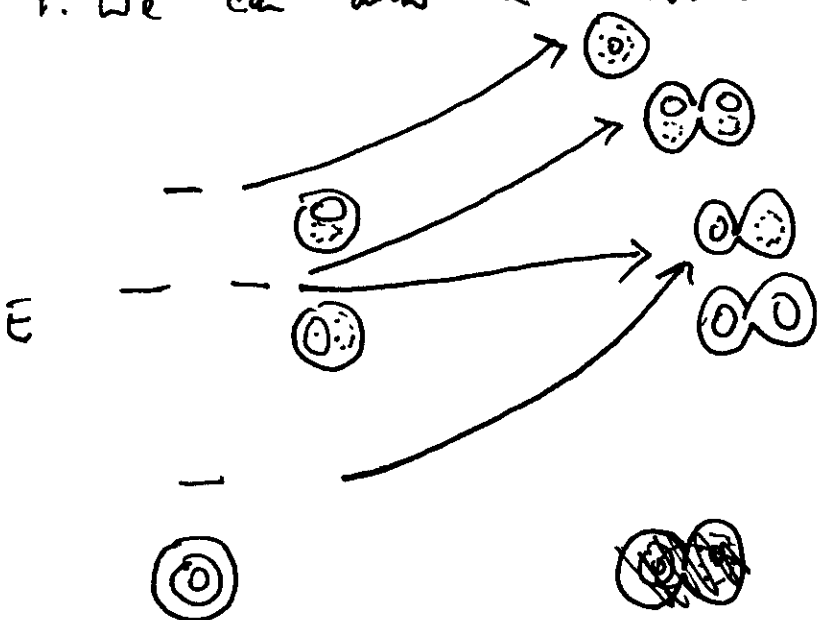
1. The 1s orbital will change as follows:



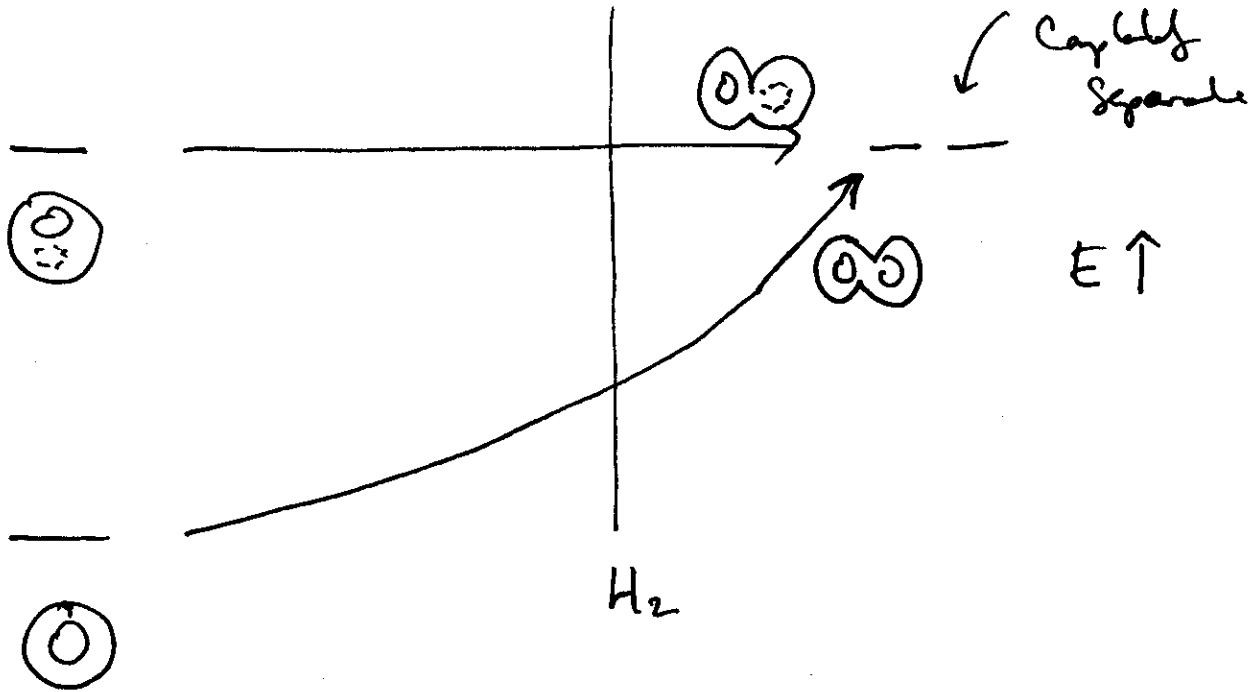
Similarly the $2p$ & $2s$ orbitals change as follows



4. We can draw a "Walsh" diagram.



5. Consider just the 2 lowest in energy "orbitals":



H_2 corresponds to just before separation.

\therefore We get as the 2 lowest modes

