# Reminiscences of the Cavendish (1954 to 1970s)

Volker Heine (TCM Group)

When I arrived in Cambridge (from New Zealand) in 1954 to do my Ph.D. with Professor Nevill Mott, there was no theoretical physics group as such in the Cavendish.

In fact the words '*Experimental*' Physics' were explicitly in the title of the Department and of the Cavendish Professorship!

However it seems that the experiences of World War II had brought less restrictive ideas to the Electors when they appointed Mott, a theoretician from Bristol, as Cavendish Professor and Head of Department from 1954. And Mott was outstanding at going around talking with experimentalists, picking up on experimental observations not yet fully understood that he would go away and think about. At first he tried to fob me off (!), suggesting I might like to work with X or Y or Z elsewhere in the Cavendish. But I had been

reading Mott and Jones' book on the Theory of Metals and Alloys on the one month journey (by ship, of course, in those days) from New Zealand, and was very much attracted that here was something for my PhD where the newish ideas of quantum mechanic were not just some set of abstract notions in Dirac notation but actually useful for calculating the properties of metals and alloys. That was the kind of theory that was very new, but also engaged with my down-to-earth New Zealand culture. So he gave me my project "Why don't you go down to the Low Temperature Laboratory, and see if you can make yourself useful."(!!) And indeed I was lucky to find there a graduate student using the de Haase - van

Alphen effect to measure for the first time (part of!) a complex Fermi surface (of aluminium), where a computation with orthogonalised plane waves was possible and directly useful. I learnt about developments in the theory of electronic structure of solids from some voluminous Quarterly Reports that JC Slater at MIT wrote and distributed. (He had the reputation that he could type even faster than he could talk!)

Mott brought John Ziman from Oxford as a young Lecturer, who immediately started to gather a group of PhD students on research projects involving electrons, phonons and phase transitions in solids. He also initiated regular series of graduate lectures, which some research students from other Cavendish groups also came to, before he moved some years later to a professorship in Bristol.

Mott's presence attracted various visiting solid state theorists

from (mostly) USA, and he arranged for PW (Phil) Anderson from Bell Labs to come annually for six months to head up the Solid State Theory group. This Phil did for seven years, while I as a young lecturer managed the practicalities of running the group and giving graduate lectures etc. during his absences. Anderson also arranged an annual series of eight separate lectures in the Lent Term on 'Science Technology and Society' by various experts that he ferreted out around Cambridge (no need to go further afield!), which attracted a very varied audience including overseas visitors and spouses of academics, and continued for eleven years. I can remember what I believe was the first public lecture on 'Test-Tube Babies', i.e. artificial insemination at the Bourn Clinic. We also managed to get the Science and Society topic incorporated in the undergraduate Part 2 'Essay' paper in Physics, with a topic kindly set and examined by Richard Eden who headed a research group on Energy Policy in the Cavendish.

The group developed a strong computational side for many years, including contributing to the development of the concept of 'pseudo-potentials' for electrons in solids. Also Sam Edwards came as another Professor in the 1970s,

and since he was working on liquids and polymers, the title of the group was changed from Solid State Theory to Theory of Condensed Matter (TCM).