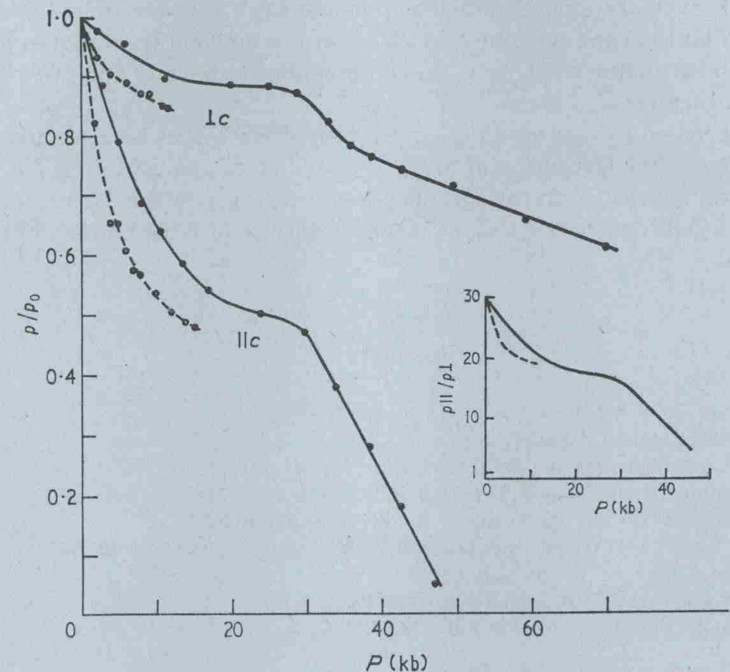

Figure 1. The relative resistivity $\perp c$ and $\| c$ for $NbSe_2$ as a function of pressure at room temperature. Inset: anisotropy in resistivity of $NbSe_2$. Full lines, Bridgman anvil apparatus; broken lines, reversible hystrostatic runs.

pressure and drops to about 5 at 45 kb. We have taken $\rho \| c / \rho \perp c$ to be 30 at atmospheric pressure (Edwards and Frindt 1971). No corrections have been made for changes in sample dimensions.

The temperature dependence of $\rho \perp c$ down to 85K was measured at 31 kb and 70 kb. The results are basically similar to the atmospheric pressure results of Lee *et al* (1969). Lee *et al* observed a small change in the slope of ρ against T at about 145K; this is known not to be a phase change. At 31 kb the change in slope appears to be at about 110K, and at 70 kb no slope change is observed.

It was suspected that the 'knee' in both ρ curves may be due to a phase change, and an accompanying change in volume. To investigate this a variation of the manganin gauge technique of Giardini and Samara (1965) was used to follow the volume decrease through the transition. The results show that a volume change starts at 33 ± 3 kb. The volume change is gradual, with a width of about 4 kb. We estimate that the change in volume is less than 2%.

We have also measured $\rho \perp c$ for 2H-$TaSe_2$ under pressure at room temperature and find that unlike $NbSe_2$, $\rho/\rho_0(\perp c)$ decreases linearly to 0·75 at 70 kb.

The large initial decrease in $\rho/\rho_0(\| c)$ and in the resistivity anisotropy for $NbSe_2$ may primarily be due to increased interlayer Nb–Nb overlap which tends to level off around 25 to 30 kb. Using the compressibilities given in the literature (Flack 1972, Jones *et al* 1972), the spacing between the Nb planes has changed by 3 to 5% at 30 kb (and the *a* spacing by 0·5 to 1%). The second resistivity drop is associated with the volume change at 33 kb. It is possible that at 33 kb the crystal goes from the trigonal coordination to the octahedrally coordinated 1s CdI_2 structure (see p 189, Wilson and Yoffe 1969), or to some other polymorph, but careful high pressure x ray work is required here. The rate of decrease in both $\rho\|$ and $\rho\perp$ above 33 kb is not too different from that at low pressures. This may in part reflect a change in the compressibility above 33 kb as well as a change in the band structure.

The superconducting transition temperature of $NbSe_2$ has been observed to increase linearly up to 17 kb (Jerome *et al* 1971). It would be of interest to see if T_c continues to increase with increasing pressure in the region where the resistivity flattens, and also to determine whether the new (possibly octahedral) form of $NbSe_2$ above 33 kb is a superconductor.

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