increase of resistance with temperature which one would expect for a typical metal. Essentially identical curves were obtained from 170 kilobars to 400 kilobars, indicating that the transition to the metallic state occurs in a very small pressure range. Above 240 kilobars measurements in the ac plane also revealed typical metallic behavior. In the region between 160-220 kilobars the electronic properties are very highly directional, in a general way analogous to the behavior of single crystal graphite.

At room temperature and atmospheric pressure an array of atoms assumes the crystalline configuration which balances cohesive and repulsive energy. Often different structures differ in energy by relatively small amounts. Because their valence electrons form strongly directionalized orbitals, silicon and germanium crystallize in the diamond lattice having four neighbors located tetrahedrally, with rather tight binding. ZnS, ZnSe, and ZnTe have much more ionic character than Si and Ge, but they crystallize in the zinc blende lattice which differs from diamond only in that alternate neighbors are anion and cation.

These are relatively open structures with only four nearest neighbors, so that one might expect that, at sufficiently high pressure, one might obtain a first order phase transition to a more efficient packing.

In Figure 7 are shown the resistance of Ge and Si as a function of pressure [8]. Ge exhibits a maximum at 30 kilobars which is consistent with optical observations [9]. The explanation is well understood but too complex for the present purposes. At 120 kilobars there is a precipitous drop in resistance by many orders of magnitude. Beyond this pressure the resistance drops slowly as one might expect of a metal. The high pressure phase indeed exhibits metallic behavior [10].