electrons moving along different incomplete orbits may become appreciable after the lapse of time intervals that are multiplets of T.

The proposed explanation of the origin of the oscillations of Z(H) in a weak field apparently solves the problem in principle, but the development of an exact theory, of course, is still a task facing us.

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CONCERNING THE METALLIC PHASE OF CARBON

M. N. Pavlovskii and V. P. Drakin
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The shock compressibility of graphite in the region of its hypothetic transition [4] into the metallic phase was investigated by the reflection method [1], with the aid of measuring devices described in the paper of Al'tshuler et al. [2,3] The densities of the synthetic-graphite samples were 1.77 and 1.85 g/cm^3. Samples of Ceylon graphite were pressed to a density 2.23 g/cm^3 from finely crushed powder.

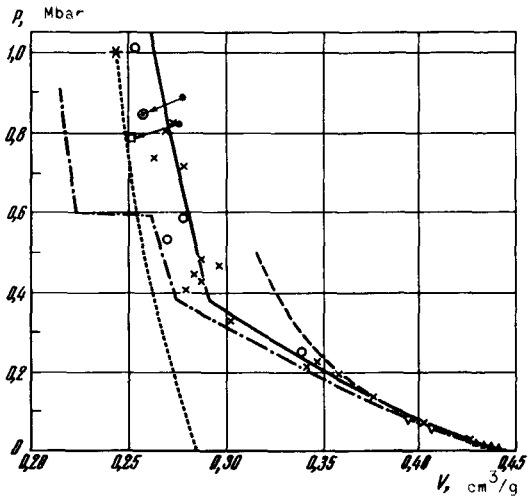
The results are plotted pressure - specific volume (P-V) coordinates. They are compared in the figure with the data of Coleburn [5], who investigated the shock compressibility of pyrolytic graphite, which has a hexagonal lattice structure, and with the results of Alder and Christian's dynamic measurements of the compressibility of graphite [4].

The latter were used by Bundy [6] to construct the phase-equilibrium diagram of carbon.

A satisfactory agreement between our present data and the results of Adler and Christian is observed up to pressures of the order of 600 kbar. A certain scatter of our experimental points in the region of pressures from 400 kbar and higher is due to the different initial density of the samples. In addition, just as in the work of Alder and Christian [4], it is noted that the registered shock-wave amplitudes, and consequently also the positions of the

experimental points in this pressure region, depend on the sample thickness. When the samples are made thinner, the positions of the points shift towards lower densities, tending in the limit to the adiabat of the metastable (pyrolytic) graphite. When the samples are made thicker, the points shift toward higher densities, forming the "diamond" section of the adiabat, as confirmed by the data of DeCarli and Jamieson [7].

The maximum permissible thickness of the sample was limited by the thickness of the striker, which determined the instant when the rarefaction wave reached the trajectory of the shock wave from the side of the striker [8]. At a striker thickness of ~1.5 mm, the permissible sample thickness did not exceed 3.5 mm. The rapid arrival of the relaxation wave is due to the high speed of sound in graphite, ~13 km/sec at ~450 kbar.



P-V diagram of carbon. ▽, △ - static data [9,10], -·-·-·- - dynamic adiabat of graphite from data of [4], ---- shock adiabat of pyrolytic graphite [5], x----* - compressibility curve of diamond, ——●— - data of the authors for artificial and Ceylon graphite, obtained with thin samples, ⊡, ⊙ - results of experiments with large-scale apparatus on artificial and Ceylon graphite, respectively.

A great disparity between our results and the data of Alder and Christian is noted in the pressure region 600 - 900 kbar, where Alder and Christian established a transition of graphite to the metallic state. At the same time, according to our data, the shock adiabat in this pressure region is merely a continuation of the adiabat of the tetrahedral modification of carbon. To explain the causes of the disparity and to obtain absolutely unique results with large measurement bases, we developed a large-scale measuring apparatus with an explosive charge of 600 mm diameter, imparting a velocity ~5.6 km/sec to a steel striker 5 mm thick.

Samples of synthetic and Ceylon graphite of density 2.04 and 2.16 g/cm^3 respectively consisted of 2 layers (5 mm each), making a total thickness of 10 mm.

The wave velocities were measured in each layer separately. The states corresponding to the measured wave velocities (for the Ceylon graphite 10.09 km/sec on the first base and 9.39 km/sec on the second, and for the synthetic graphite 9.62 and 8.91 km/sec respectively) are shown on the plot. The same plot shows our data, which characterize the dynamic compressibility of single-crystal diamond samples.

Also located on the continuation of the "diamond" adiabat are the experimental points characterizing the shock compressibility of the graphite at pressure P_g = 1.55 Mbar (D = 12.48 km/sec, V = 0.249 cm^3/g, ρ_0 = 1.82 g/cm^3) and P_g = 3.25 Mbar (D = 16.88 km/sec, V = 0.205 cm^3/g, ρ_0 = 1.85 g/cm^{3}0.

On the basis of the foregoing material it must be admitted that the Alder and Christian claims of observation of a metallic phase of carbon at pressures ~800 kbar are in error.

They were apparently obtained with samples whose thicknesses did not correspond to the striker thickness, and consequently, the parameters of the shock wave in the graphite were distorted by the relaxation waves.

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NOISE LIMITATIONS ON THE RECONSTRUCTION OF THREE-DIMENSIONAL PICTURES

A. L. Mikaelyan and V. I. Bobrinev

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Holography methods make it possible to obtain three-dimensional pictures having a high resolution and a large dynamic brightness range [1-4]. However, the realization of these advantages is hindered by the presence of noise, which comes into play during the reconstruction of the image in a manner entirely different from ordinary photography.

Indeed, since the emulsion is not a continuous medium, but a system of randomly disposed grains separated by appreciable distances (compared with the wavelength λ), the interference pattern registered on the hologram has discontinuities. When coherent light is transmitted through such a hologram, the discontinuities become sources of scattered radiation, whose distribution in space obeys laws that are characteristic of shot noise.

The final formula characterizing the ratio of the useful signal power to the power of the background produced by scattering from these inhomogeneities is

$$P_s/P_n = n_0\lambda^2 \frac{R^2}{S_{ob}} \frac{f'^2(W_h)}{f(W_h)} \frac{S_{eff}}{S_h},$$

where n_0 is the density of the emulsion grains, R the distance from the hologram to the diffused object of the photography, S_{ob} the area of the object, $f(W_h)$ the dependence of the