by the presence of intermolecular hydrogen bonds O—H ... O of length 2.70 Å.

In the second trend, a number of studies of the fine structure of x-ray absorption spectra have been carried out. The K, L_I, L_{II}, and L_{III} absorption spectra of metallic silver and the absorption spectra of silver and zinc in the α, β, and ϵ phases of the silver-zinc system have been studied experimentally. Basically, the experimental spectra obtained agree with those calculated by the "short-range-order" theory. This theory was generalized to the case of the L_{II} and L_{III} spectra; a formula was derived for calculation of the relative L_{II} and L_{III} coefficients for the absorption of x-rays by the crystal lattices. Further, this theory was applied for the first time to the binary metallic alloys Ag—Zn and Cu—Zn and to the spectra of relatively heavy metals (Pb, Ag, Cd, In). The "short-range-order" theory made it possible to ascertain the basic laws governing the x-ray absorption spectra of the metals and alloys studied.

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V. M. Agranovich and V. L. Ginzburg. Scattering of Light with Formation of Excitons.

The classical method of studying exciton spectra is to obtain absorption spectra. Some data can also be obtained from measurements of the frequency dependence of the refractive index. Finally, as far as the optical methods are concerned, dispersion curves for excitons (the dependence of their frequency $\omega_l(\mathbf{k})$ on the wave vector **k**) can be found in a number of cases by investigating Raman scattering of light in crystals with exciton formation. The latter method has recently been undergoing steady development as a result of the efficiency of using laser light for these purposes[1]. The Raman-scattering method has actually made it possible[2] to obtain a very definite indication of the existence of a "new" (third) normal wave[3-5] in a gyrotropic crystal (quartz), one that has not yet been observed by other methods. In addition to the problem of the "new" wave, the paper, which is based on[6], discusses the general theory of Raman scattering of light in crystals with formation of excitons with allowance for absorption (in particular, the authors discuss the so-called polaritons or real excitons, which correspond to exact solutions (normal waves) of the homogeneous electromagnetic-field equations; for details see[4]). Special attention is given to Raman scattering of light with formation of surface excitons (polaritons).

It may be supposed that the Raman-scattering method will be developed vigorously and turn out to be one of the most effective ways to study various optical bulk and surface excitons and spatial dispersion in crystals, as well as in other media (liquid crystals, amorphous bodies, polymer formations, inhomogeneous structures of the layered-compound type, etc.).

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G. A. Smolenskiĭ. Certain Problems in the Physics of Nonmetals.[1)]

1. Magnetooptical phenomena in magnetic semiconductors and dielectrics. The discovery of coherent light sources, the preparation of transparent magnetically ordered materials, and progress in the technique of growing them have given powerful impetus to the development of optical and magnetooptical research[1-3]. It is a well-known fact that this research yields a wealth of information on the energetic structure of crystals. Types of elementary excitations that are associated with exchange interaction can also be brought out in magnetically ordered crystals in this way.

A number of new optical phenomena were predicted: the Cotton-Mouton effect in antiferromagnetics, the Faraday effect in an electric field in magnetoelectrics and under pressure in piezomagnetics.

An unusually large magnetooptical effect, quadratic in the magnetization, has been observed and explained by taking exchange interactions into account.

It is shown that magnetically ordered crystals constitute a gyroanisotropic medium, since the Faraday (gyrotropy) and Cotton-Mouton (anisotropy) effects are comparable in magnitude.

Features of the optical indicatrices of magnetic crystals are studied, and it is shown that these crystals are generally optically biaxial. The positions of the optical axes depend strongly on temperature in many crystals. Anomalies in light scattering and the magnetooptical effects are observed at the points of magnetic phase transformations (Curie, Neel, Morin, and magnetization cancellation).

2. Hypersonic waves in nonmetallic crystals. The production of hypersonic waves in crystals is associated with the name of K. N. Baranskiĭ (Moscow State University, 1957).

Measurements of the frequency and temperature dependences of hypersonic-wave attenuation were made in

*In his paper, the author was concerned principally with those divisions of solid-state physics that are being developed in the Institutes of the Turkmenian Academy of Sciences.