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THE APPLICATION OF GREEN FUNCTIONS METHOD TO THE THEORETICAL DESCRIPTION OF HYPERRAMAN SCATTERING LIGHT PHENOMENON.

The non-linear effects can be classified by the number of quasi-particles which participate in an elementary act. Raman scattering process is characterized by participation of three quasi-particles. They are two photons and two phonons. Hyperraman scattering covers the participation of four quasi-particles.

They are two photons of primary radiation, one photon of resulting radiation and one phonon. The energies of the mentioned quasi-particles are related by the law of energy conservation.

The consideration is presented within the theory of polyaritons which appear to be so-called "hybrids" of electromagnetic waves and electronic or vibration states. This effect has been considered earlier with the help of the method of little excitations. However, a lot of unsolved problems have been left.

As it was mentioned in literature, the contribution into the effects of the fourth order cause a great variety of mechanisms. They are:

- a) the interaction of the cross-photons field with the crystal charges;
- b) the interaction of Coulomb excitations;
- c) the kinematic interaction;
- d) the cascade processes.

The mentioned above mechanisms happen to be to some extent actually being observed in different intervals of spectrum. The contributions they cause can be divided using the polarization measurements as well as by measuring the frequency dependency for the primary and scattering radiation.

The Green function method has been applied to the ordinary scattering and a lot of interesting results have been obtained. This report presents the application of this method to hyperraman scattering, which can be considered as the effect of higher order and allows :

- to study the highest approximations of the theory of excitation
- to avoid many of difficulties, which happen in case when the frequency of the primary and scattering radiation is met at the absorption line.

These difficulties are caused by getting the separated expressions in the formula for the intensity of the scattering radiation.

At the definite conditions hyperraman scattering causes the photons of scattering the light on flu light when two photons with the frequencies w_1 and w_2 are transformed into two another w_3 and w_4 . There is the relation between these frequencies: $w_1 + w_2 = w_3 + w_4$. It is caused by the law of energy conservation.

All mentioned above concerning the hyperraman scattering can be applied to the phenomenon of scattering the light on the light.

The presented report deals with practical recommendations concerning the experiments in which observations of the mentioned effects take place.