Summarizing literary data, devoted to the EPR study of impact diamonds (diamonds from astroblemes) it should be noted that the obtained results have extremely scanty information. As known from [1], the spectra of EPR from the defects in these diamonds consist of two components. The first component with $\Delta H = 6-9$ Oe, is attributed to hole defects, the second one with $\Delta H = 2-5$ Oe - to dislocations.

We have studied 25 grains of diamonds from astroblemes using the EPR method. The investigations were done at the EPR spectrometer of $Q$-diapason ($T=300$ K). The measurements were done in atmosphere of gaseous $N_2$ to exclude the influence of paramagnetic centres of air. The individual grains with mass from 0.000048 to 0.002620 g were studied. For paramorphos of diamonds and diamond-lonsdaleite by graphite with clear-cut forms, we have studied angle dependence of line position and their width.

All grains with the exception of one have spectrum consisting of the packet of lines in the region $g=2.0030$. For anomalous model there's the spectrum of three lines STS with superfine structure (with parameters: $g = 2.0025 \pm 0.0003$, $A_h = 38.1 \times 10^{-6}$ sm$^{-1}$, $A_\perp = 27.1 \times 10^{-6}$ sm$^{-1}$) that are connected with N in lattice. But the repeated study of this grain after removal of its surface showed the full absence of N-defects. Its attests the localization of these N-defects on the surface of the grain.

The study of spectra in region from $g = 2.0030$ permitted to do the supposition, that they are superposition, at least of two low allowed lines. The study of influence of the power of electromagnetic field on the intensity and width of the lines shows that the lines belong to different defects. The first defect doesn't feel saturation from electromagnetic field and can be defined as isotropic $g=2.0026$, the second one begins to be saturated at level of power of electromagnetic field 50 mKw. It has anisotropic g-factor, one of the value of which is 2.0021. The electron defect, that doesn't show the dependence from size of power of electromagnetic field, is correlative with presence of lonsdaleite (Fig. 1), which is confirmed by X-Ray study in that grains.

Without saturation, both of centres are characterized by width of resonance curve $\Delta H_{m}$.

Fig. 1. The dependence of the form of line (spectrum EPR) from power of electromagnetic field: a) 36 dB; b) 52 dB.
Suchardjewkiy et al. = 4.5 - 4.7 Oe. Such a size of \( \Delta H \) is a specific peculiarity of natural impact diamonds.

We have shown the dependence of the position of lines in EPR spectrum on the orientation of magnetic field relatively cristalllographic directions. It becomes to the revealed more evident in the spectra of the grains which were subjected to irradiation by \( \gamma \) - quants (Fig. 2). The modification of configuration of spectra after irradiation makes the presence of two centres of different nature in the studied grains more evident.

Besides, there's a correlati-ve dependence between the quantity of defects and density of grains (Fig. 3).

The results received during the study of diamonds from astroblemes by EPR are essentially distinguished from early well-known results.

Investigation of diamonds from astroblemes done by the EPR in Q-diapason provide ample opportunities of this method for study of impact diamonds because it permits:

1. to set the presence of different defects, to explain their physical nature and place of their localization in lattice of their grain;
2. to diagnose the presence of the other phases of carbon in the investigated grains; it gives the possibility for operative selection of grains by this sign.

Reference: