does not exceed 3×10^4 cm^2/V-sec). The larger value of the photoelectron mobility $\mu_{n\ell}$ in the sample 1N, in which the dark mobility μ_{nd} is smaller than in 2N, is due in our opinion to the lower interelectronic interaction in this sample (the density of the dark electrons is approximately one-fifth that in 2N). Thus, the experimental results are in good qualitative agreement with the theory.

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SPECTRA OF CALCIUM IONS Ca XV AND Ca XVI OBTAINED BY FOCUSING LASER EMISSION ON A TARGET

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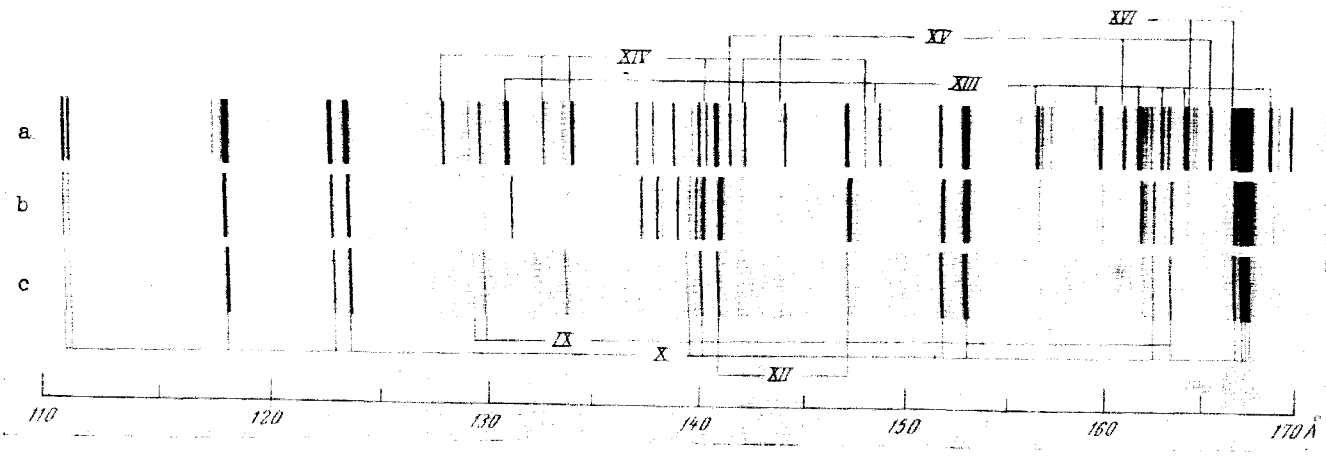
It was shown in [1] that when a laser giant pulse is focused on a solid target in vacuum, a dense high-temperature plasma is produced and contains multiply-ionized atoms of the target material, which emits an intense line spectrum in the vacuum-ultraviolet region. In particular, the lines Ca XIII and Ca XIV were obtained and identified.

By improving the conditions for the focusing of the laser emission (energy 10 J, duration 15 nsec at half-height), we succeeded in obtaining spectrograms in which a number of lines were identified as belonging to Ca XV and Ca XVI. These lines, like the previously-considered Ca XIII and Ca XIV lines, are due to transitions of the type $2s^22p^n - 2s2p^{n+1}$, where n = 4, 3, 2, and 1 for Ca XIII, Ca XIV, Ca XV, and Ca XVI, respectively, and lie in the interval 120 - 240 Å.

The fact that the Ca XV spectrum was obtained in the laboratory is of considerable astrophysical interest. The intense yellow corona line λ = 4694 Å is interpreted as a forbidden magnetic-dipole transition between the fine-structure components $^3P_0 - {}^3P_1$ of the ground state of the Ca XV ion [2]. This interpretation is based on extrapolating the corresponding terms in the isoelectronic series, and is not universally accepted to date. The λ = 5694 Å line does not always appear in the spectrum of the corona, characterizing apparently very hot condensations, and a reliable identification of this line is very important for the interpretation of these observations. By obtaining under laboratory conditions the resonance Ca XV lines, which are located in the vacuum region of the spectrum, it is possible to measure directly the splitting of the ^3P term. We are presently measuring the obtained spectrograms, and the preliminary results do not contradict the assumed interpretation that the λ = 5694 Å line is the $^3P_0 - {}^3P_1$ line of Ca XV.

The figure shows spectrograms of the section 110 - 170 Å and indicates the most intense identified lines of the aforementioned ions, as well as the already known [2] Ca IX, Ca X,



Spectrograms of calcium under different conditions of laser beam focusing.
Diameter of focal spot: a - 0.1 mm, b - 2 mm.

Ca XII, and Ca XIII lines (there are no intense Ca XI lines in this region of the spectrum). From a comparison of the spectrograms it follows that the lines of the ions with higher multiplicities vanish when the laser-emission flux density is reduced by beam defocusing, whereas the Ca X lines practically retain the same intensity.

For a similar plasma obtained by focusing the beam on a carbon target, we determined the density of the electrons in the plasma with the aid of high-speed interferometry at an exposure ~3 nsec. Towards the end of the laser pulse the plasma has a form close to a hemisphere of radius ~1.5 mm. The density of the electrons in the plasma drops from 10^{20} cm^{-3} at the surface of the target to 10^{17} cm^{-3} at the boundary [3].

T a b l e

Number of spectrogram	Maximally-observable ion	Ionization potential	Laser emission flux density W/cm^2		
				From [4]	From [5]
a	Ca XVI	898	5×10^{12}	210	300
b	Ca XIII	729	2×10^{11}	120	165
c	Ca XII	659	2×10^{10}	100	130

The presence of lines of different calcium ions in a relatively narrow spectral region makes it possible to estimate the electron temperature of the plasma, T_e, from the ionization potentials of the ions with maximum multiplicity present in the plasma. The table lists the values of the temperatures corresponding to the ion concentration $N_m/N_{m-1} \approx 0.1$, where N_m is the concentration of ions of maximum multiplicity, recorded on the given spectrogram.

In estimating the plasma temperature, we assumed the so-called "corona model" of the plasma and used House's ionization and recombination cross sections [4], as well as the later data of I. L. Beigman and L. A. Vainshtein [5], who took into account photorecombination at excited levels (calculation shows that dielectric recombination does not take place at the given values of the electron density).

It should be noted that the use of the "corona model" in our case of a dense plasma may not be perfectly valid. No account is taken in the corona model of triple recombinations with electrons. Estimates show, however, that the role of such processes is apparently small, and their inclusion leads to higher values of T_e. On the other hand, no account is taken of photoionization processes due to the large optical thickness of the plasma in the lines; allowance for these processes yields a lower value of the temperature.

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CHANNELING OF ALPHA PARTICLES IN BERYLLIUM OXIDE

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1. Measurements of the ranges of fast charged particles in crystalline solids have led to the discovery of the phenomenon of deep penetration of fast particles in crystals along channels between the close-packed rows or planes of atoms with small indices [1-4]. The investigations of this phenomenon were made for the most part on crystals with metallic [5-8] or covalent [9-10] bonds. However, as shown analytically [11] and also in a mathematical experiment with an electronic computer, the channeling of charged particles can take place also ion ionic crystals, particularly in BeO [12].

We deemed it of interest to investigate experimentally the channeling of fast charged particles in a BeO crystal.

2. Beryllium oxide crystallizes in a hexagonal system and has a wurtzite structure. BeO forms ionic crystals in the form of prisms with a = 2.69 Å, c = 4.37 Å, c/a = 1.63, and with cleavage in the {10$\bar{1}$0} plane. Their structure consists of close-packed hexagonal formation of oxygen atoms, in which half the tetrahedral voids is occupied by beryllium atoms.

The character of the forces of interaction between the atoms in the BeO lattice differs from the interaction in the crystals with metallic and covalent bonds. The lattice