resonant atomic line and for a rectangular distribution of the laser radiation.

By observing the resonant change of the multiphoton-ionization process in a sufficiently wide range of variation of the static deviation from resonance (the radiation frequency) and of the radiation intensity, we can measure the dependence of the resultant Stark shift on the radiation intensity. Figure 2 shows the result for the transition from the state 2^3S to the state 14^3S.

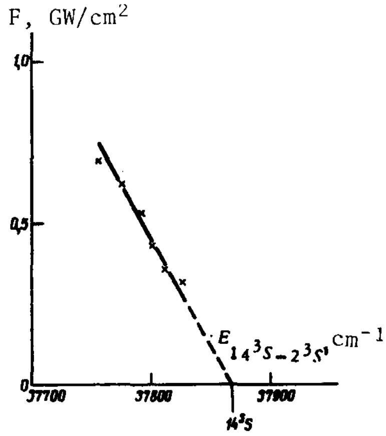

Fig. 2. Energy of transition between the states 2^3S and 14^3S in the field of a neodymium laser.

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EFFECTIVE MODULATION OF LIGHT WITH BARIUM-STRONTIUM NIOBATE SINGLE CRYSTALS

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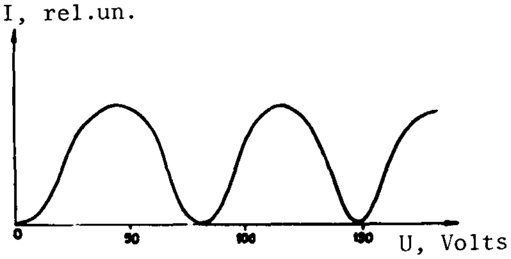
$Ba_{0.25}Sr_{0.75}Nb_2O_6$ single crystals were used to modulate light from an He-Ne laser was modulated to a depty of 98% at a beam aperture 4×4 mm, a bias voltage ∿ 500 V/cm, and a half-wave voltage 50 V for a sample of unit dimensions.

Ferroelectric crystalline solid solutions of barium and strontiun niobates, $Ba_xSr_{1-x}Nb_2O_6$, have large transverse electro-optical effect coefficients, especially in the case of strontium-rich compositions [1]. Their use as electro-optical light modulators was limited until recently by the difficulty of obtaining homogeneous single crystals of these solid solutions. We report here effective modulation of a laser beam with crystals of composition $Ba_{0.25}Sr_{0.75}Nb_2O_6$.

The measurements were performed by a polarization-optical method [2] at a wavelength 0.63 μ. The voltage was applied to the sample either from an acoustic generator or from an infralow-frequency oscillator. The radiation source was an He-Ne laser and the indicator was a photomultiplier. The spontaneous birefringence of the crystals was calcelled out in the measurements with a quartz compensator.

The samples were plates cut along the c-axis of the crystal, with thickness 3 - 4 mm and cross section from 3×3 to 7×7 mm. The samples did not have the usual growth bands typical of barium-strongium niobate crystals [3, 4]. The refractive-index gradients did not exceed 1×10^{-5}/cm and 5×10^{-5}/cm for n_o and n_e, respectively. The transmission of the residual light flux, with the polarizers crossed at 45° to the crystal optical axis, was 2 - 4% at a beam aperture up to 4×4 mm. The faces of the plates were oriented perpendicular to the [100], [010], and [001] directions with accuracy ±2°, and were optically polished. The light beam was directed



Intensity of light passing through $Ba_{0.25}Sr_{0.75}Nb_2O_6$ sample vs. amplitude of voltage applied to a sample of unit dimensions.

along [010] or [100] perpendicular to the broad face of the plate, and the electric field was applied along the c-axis.

The electrodes were made of aquadag, silver-filled paste, or silver evaporated in vacuum. The samples were made single-domain at temperatures 65 - 150°C (the Curie temperature is 60°C) in a field up to 10^4 V/cm applied along [001], followed by cooling in the field. The contact material exerted a noticeable influence on the half-wave voltage in the initial sample; it was necessary to choose a separate single-domain regime for each type of contact. An important role was played by the natural unipolarity, viz., when the voltage was applied in the unipolarity direction, the single-domain regime set in more rapidly and more effectively, without deterioration of the optical homogeneity of the samples. The degree with which the single-domain regime was reached was monitored against the minimum of the half-wave voltage at room temperature.

The light was modulated at frequencies from 0.1 to 2×10^4 Hz. The figure shows the variation of the intensity of the light passing through the sample against the amplitude of the voltage applied to a sample of unit dimensions. It should be noted that the domain structure in the $Ba_{0.25}Sr_{0.75}Nb_2O_6$ crystals becomes unstable even slightly above room temperature (35 - 45°C) [5], so that the samples become partly depolarized after becoming single-domain. This is the cause of the increased value ($\sim$ 70 V) of the half-wave voltage in weak fields. In the presence of a bias field exceeding $\sim$ 500 V/cm, the half-wave voltage is 50 V for a sample of unit dimensions, which is approximately 1/50-th the value for lithium-niobate crystals. The depth of modulation reaches under these conditions 98% at a beam aperture 4×4 mm. This demonstrates that barium-strongium niobate crystals are effective enough light modulators.

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PARAMAGNETIC EXCITATION OF ION-CYCLOTRON AND ION-ACOUSTIC WAVES IN A PLASMA WITH AN ALTERNATING ELECTRIC FIELD UNDER CONDITIONS OF THE LOWER HYBRID RESONANCE

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We present the results of experiments that have revealed paramagnetic excitation of ion-cyclotron and ion-acoustic oscillations of a plasma situated in an alternating electric field of frequency ω_0 close to the lower hybrid resonance frequency $\omega_{LH} = \omega_{pi}(1 + \omega_{pe}^2/\omega_{He}^2)^{-1/2}$

It is known that parametric excitation of various modes is possible in a plasma situated in an alternating electric field. Theoretical studies have shown that if the frequency of the pump field is close to the frequency of the lower hybrid resonance ω_{LH}, then ion-cyclotron and ion-acoustic oscillations are excited in the plasma [2 - 4]. Decay excitation of ion-acoustic