duced by dissociation of a molecule with subsequent ionization of the resultant neutral atoms, or by ionization of the molecule with subsequent dissociation of the molecular ion. Additional experiments are necessary to determine the probabilities of these processes.

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MONOPULSE GENERATION WITH $CaF_2:U^{3+}$ CRYSTALS

B. A. Ermakov, A. V. Lukin, A. A. Mak, and D. S. Prilezhaev
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Q-switched lasers using ruby and glass or calcium tungstate activated with Nd^{3+} are by now universally known. Attainment of monopulse generation in the 2.36 μ infrared region with $CaF_2:Dy^{2+}$ has recently been reported [1]. In this paper we report attainment of monopulse generation with $CaF_2:U^{3+}$ crystals at wavelengths 2.2 and 2.51 μ. A diagram of the experimental setup is shown in Fig. 1. The crystals were cooled to 80 - 90°K by a jet of nitrogen gas evaporated from the liquid phase. To prevent distortion of the resonator by condensation of water vapor and by the convection currents, the space between the crystal and the protective window was evacuated. The protective window was a plane-parallel plate of quartz glass finished to high tolerances. A semitransparent coating with reflection coefficient R = 0.95 ± 0.6 was deposited on one end of the crystal. The cavity switching was by means of a rotating total internal-reflection prism. The pump-lamp ignition was synchronized with a photoelectric system coupled to the rotating prism. The prism was rotated at 1 - 2 x 10^4 rpm. The crystals used were 3 - 55 mm in diameter and 20 - 30 mm long. The radiation receiver was a Ge:Au photoresistance, and the over-all resolution of the measuring apparatus was 2 x 10^{-7} sec. The generated energy was measured with a bolometer.

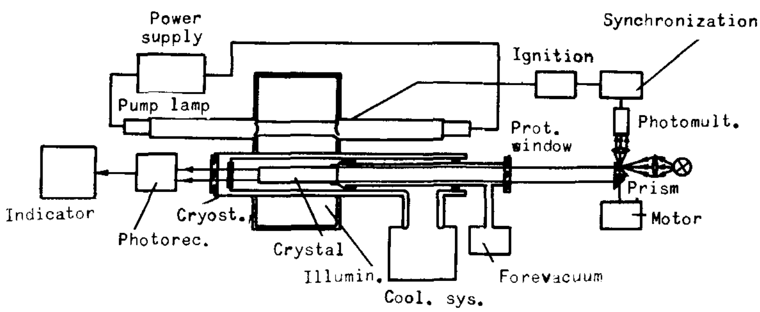

Fig. 1.

It was shown in [2] that either 4-level (λ_4 = 2.61 μ) or 3-level (λ_3 = 2.22 μ) lasing is possible in $CaF_2:U^{3+}$ crystals. A transition from 4-level to 3-level lasing is possible when the excess over the threshold pump energy, necessary for the excitation of lasing action in the

4-level scheme with mirrors having reflection coefficients R_1 and $R_2 = 1$, is

$$n \geq \left(2 - \frac{\Delta\lambda_3\, \lambda_4^4\, \eta_4}{\Delta\lambda_4\, \lambda_3^4\, \eta_3}\right)^{-1} N_0/k_0 \, , \qquad (1)$$

where N_0 is the activator concentration, k_0 the threshold inversion for 4-level lasing at R_1 or $R_2 = 1$, $\Delta\lambda_3$ and $\Delta\lambda_4$ the line widths, λ_3 and λ_4 the wavelengths, and η_3 and η_4 the luminescence quantum yields for the 3- and 4-level schemes, respectively.

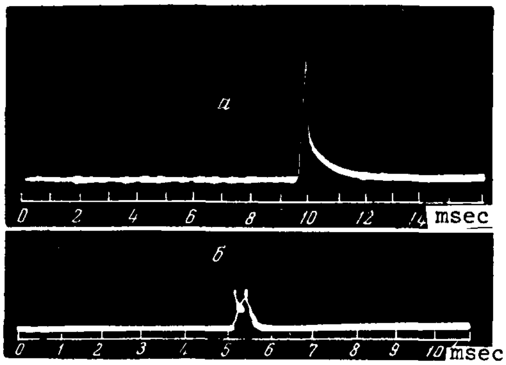

Fig. 2.

In the case of monopulse generation, appreciable inversion can be attained; for this reason, and allowing for the peculiarities of Q-switching by a rotating prism, we could expect the lasing in this mode to be in accordance with the 3-level scheme. An oscillogram of monopulse lasing with $\lambda_3 = 2.22\ \mu$ is shown in Fig. 2a. The lasing pulse duration, measured on the oscillogram, is determined by the inertia of the apparatus and amounts to 2×10^{-7} sec. The laser radiation energy was 0.1×10^{-3} J. Assuming, in analogy with a ruby laser having the same resonator parameters (transmission loss 0.5 and resonator length 3 mm) and the same excess over threshold (~4-fold), that the true pulse duration is not more than 5×10^{-8} sec, we find that the pulse power is $\sim 4 \times 10^3$ W. In several crystals we obtained monopulse 4-level generation ($\lambda_4 = 2.51\ \mu$), apparently, because of the high concentration of the activator in these crystals [see expression (1)]. The shape of the pulse was the same as in Fig. 2a.

The maximum laser energy in the nonpulse was 10^{-3} J in this case, which yields, making the same assumptions concerning the laser pulse duration, a power of $\sim 5 \times 10^4$ W. At smaller prism speeds, several laser pulses were obtained rather than one. One such oscillogram is shown in Fig. 2b.

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EFFECT OF MASS SPLITTING WITHIN THE BARYON OCTET ON BB SCATTERING

V. I. Zakharov and I. V. Tyutin

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1. The consequences resulting from unitary symmetry for baryon-baryon scattering at low energies were considered in several papers [1]. One important result is the prediction that several reactions in which strange particles participate, connected in the limit of unitary symmetry with nucleon-nucleon scattering, are of resonant character. On the other hand, the