of the polarization-ellipse axes, due to T-parity nonconservation, would occur only when the sign of the magnetic field at the source nuclei is reversed. Such a procedure makes it possible to avoid a number of phenomena imitating the useful effect, viz., the change of the geometry when the velocity is changed to a value corresponding to a line with opposite m_i and m_f, differences in the populations of nuclear sublevels, etc.

The object of the investigation was chosen to be the ferromagnetic alloy Pt_3C_r [4]. Another known ferromagnetic alloy, Re_3Pt, was rejected by us since it is a magnetically rigid material, and this would raise additional difficulties in performing such an experiment.

The Pt_3Cr alloy was made of platinum containing 92% of Pt^{196}.

The resonance-absorption spectra were obtained at 78°K using an electrodynamic vibrator with a feedback system.

The main results of the epxeriment are listed in the table.

	$Pt_3Cr - Au$	$Pt - Au_4Mn$
Isomer shift, mm	-9.7 ± 1.0	-2.8 ± 0.3
$10^6 \cdot H_{ext}$, G	1.3 ± 0.1	0.87 ± 0.07

An analysis of the results with allowance for the relative isomer shift of the Pt-Au pair (-1.2 mm) shows that Pt_3Cr and Au_4Mn satisfy the imposed requirements, and that when the relative velocity of the two is zero, the polarized γ radiation of the source, corresponding to transitions from the sublevel $m_i = -1/2$, will experience resonant scattering in the absorber.

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LASER OPERATING IN THE VACUUM REGION OF THE SPECTRUM BY EXCITATION OF LIQUID XENON WITH AN ELECTRON BEAM

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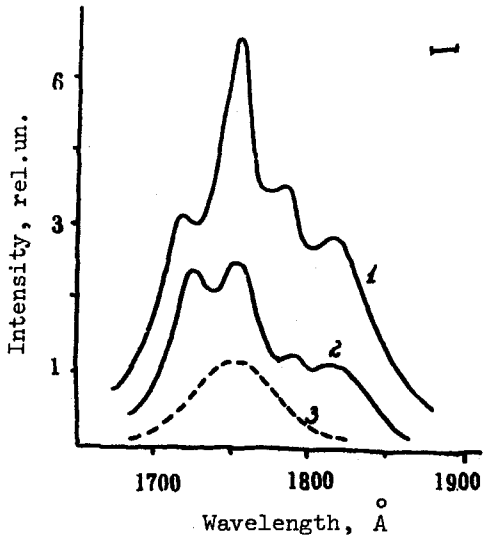
The use of condensed noble elements (Xe, Kr, Ar, Ne, He) for lasing in the region of the vacuum ultraviolet was proposed and discussed in [1, 2]. The development of a laser using condensed inert gases is made easier by the feasibility of realizing a four-level scheme [3].



Emission spectrum of liquid xenon: 1 - pump current density 150 A/cm^2, 2 - 70 A/cm^2, 3 - emission spectrum at low excitation density. The resolution of the monochromator is shown in the upper right-hand corner.

In earlier experiments on the excitation of condensed noble gases (Xe, Kr, Ar) and their mixtures by means of fast electrons, the results were the luminescence spectra and estimates of the luminescence efficiency, and indications of weak stimulated emission of liquid xenon at ∿1760 Å [3 - 5]. These experiments were performed without mirrors and at low excitation density (the maximum current density was 25 A/cm^2).

We describe here experiments aimed at producing lasing in liquid xenon in the vacuum region of the spectrum by excitation with a powerful beam of fast electrons (electron current density up to 200 A/cm^2).

The emission spectrum of liquid xenon is shown in Fig. 1 for two values of the pump current density (the dashed curve shows for comparison the form of the spectrum at a low excitation density). At electron current densities higher than 100 A/cm^2 the intensity of the 1760 Å line increases strongly, and the half-width of the line reaches 20 Å, which is close to the spectrometer resolution (17 Å), whereas the half-width of the same line at low excitation density is 80 Å.

The emission lines against the background of a broad line with half-width 150 Å at wavelengths 1715, 1785, and 1815 Å correspond possibly to transitions from the excited levels of the molecule Xe_2 ($^{1,3}\Sigma^+_{u,g}$) to the ground level. At current densities higher than 100 A/cm^2, a bright spot appeared on a luminescent screen on which the radiation was projected. The beam divergence estimated from the dimensions of this spot on the screen was approximately 7°. The dependence of the radiation intensity of the 1760 Å line on the excitation density makes it possible to estimate the threshold current density, 30 - 60 A/cm^2.

The radiation was registered with a VM-1 monochromator with a 1200 line/mm grating. Besides recording the spectra, we registered the radiation also with the aid of a vacuum photodiode with high time resolution. The waveform and duration of this radiation pulse agreed with the waveform and duration of the electron-current pulse ($\Delta\tau \sim 10$ nsec).

We used semitransparent aluminum mirrors sputtered on lithium-fluoride substrates and coated with a protective layer of magnesium fluoride. The mirror transmission at 1700 Å was 1 - 2%, and the reflection coefficient was 50 - 60%. The equivalent absorption coefficient due to the mirrors in the resonator was thus 0.5 cm^{-1}.

The electron source was a pulsed electron gun yielding electron current densities up to 300 A/cm^2 at energy up to 1 MeV and current-pulse durations 10 nsec.

The use of other noble gases [3 - 5] in the condensed state makes it apparently possible to obtain stimulated emission in a wide band, up to 600 - 800 Å.

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PARAMETRIC GENERATION OF LIGHT IN HIGH-EFFICIENCY NONLINEAR $LiIO_3$ AND α-HIO_3 CRYSTALS

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The present paper is devoted to the results of an investigation of tunable parametric light generators (PLG) for the near infrared and visible bands, using new nonlinear crystals of the iodate group. These crystals were used earlier in frequency doublers [1, 2] and in experiments on parametric luminescence [3]. We used these crystals for the first time to develop effective parametric generators (energy efficiency ~10%). Investigations of the nonlinear properties and optical strength of the grown crystals have shown that the limiting coefficient of modulation of the dielectric constant in $LiIO_3$ and α-HIO_3 crystals exceed by one order of magnitude the values for $LiNbO_3$ and KDP, respectively. Both crystals are grown from solutions and crystals measuring several centimeters and having good optical quality have been obtained by now. The $LiIO_3$ crystals were grown on z-cut primers by the method of evaporation from the solution at 40 and 60°C at pH ~ 1.5. The crystal growth rate did not exceed 0.5 mm per day. The raw materials for the growing of $LiIO_3$ were HIO_3 of ChDA (analytic) grade and specially purified Li_2CO_3.

The PLG pump source used in the experiment was the second harmonic of a neodymium-glass laser operating in the single-mode regime. The second-harmonic power density reached 250 MW/cm^2 and the beam diameter was 2.5 mm.

$LiIO_3$ crystal. The working element was cut at an angle $\theta = 30°$ to the z axis. The crystal length was 1.6 cm. The effective nonlinear coefficient for the oo-e interaction was in this case $d_{eff} = 2\sin\theta d_{31}$.[1)] The PLG resonator was made up of flat dielectric mirrors of high reflectivity for the signal wave only, $R_s > 99\%$.

The reflection coefficient for the idling pump wave was less than 20% (single-resonator PLG) [5, 6]. The tuning range was determined by the transparency of the crystal (Fig. 1), and the absorption band of the sample started near 2.7 μ.

The tuning was by rotating the crystal inside the PLG resonator (Fig. 2), whereby the signal wavelength changed from the degenerate value $\lambda_s = 1.06$ μ to $\lambda_s = 0.68$ μ, and the idling wave changed accordingly from 1.06 to 2.4 μ.

[1)] The values of d_{31} measured in different laboratories differ somewhat, with $d_{31}(LiIO_3) = (31 \pm 3)d_{36}(KDP)$ in [2] and $(16 \pm 2)d_{36}(KDP)$ in [4].