hypertritium, describes not only the triplet s-phase, but also leads to a binding energy of 9.12 MeV for the ordinary tritium.

The table lists the sets of the Λ-N potential parameters leading to best agreement between the data on the cross section for elastic Λ -p scattering with a value $B_\Lambda = 0.18$ MeV for ${}_\Lambda H^3$. The parameters of the effective-radius theory, obtained with these potentials, are compared with the optimal values given in [1].

The figure shows results of the calculation of Λ-p scattering in the effective-radius approximation for s-waves. The term that violates the isotopic invariance of the Λ-N interaction was not taken into account. The experimental values were taken from [4].

We note that when the repulsion radius is decreased it is impossible to reconcile the variation of the elastic Λ-p scattering cross section with the ${}_\Lambda H^3$ binding energy for any reasonable value of the Λ -N potential. (By repulsion radius we mean here the value of the radius $r_r = r_m - a_m \ln 2$ at which the potential (1) reverses sign.)

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SELF-REFLECTION OF ULTRASHORT LIGHT PULSES FROM CONDENSED MEDIA

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When a sufficiently intense light pulse of duration in the nanosecond range is incident on a condensed medium (either a metal or a dielectric), it should be totally reflected. The reason for this effect is that if the light-wave intensity is high enough the atoms of the medium should become rapidly ionized, within one or several periods of the wave (single ionization suffices), and an electron plasma with electron density $n_e = n_a$ is produced (n_a - density of the atoms in the medium). If the radiation wavelength is

$$\lambda > \lambda_p = 3{,}3 \cdot 10^{10} \cdot n_a^{-1/2} \qquad (1)$$

(λ is in microns and n_a in cm^{-3}), then the plasma turns out to be superdence and hence totally reflecting during the remaining part of the pulse, in which almost all the energy is contained[1]. Such a "reflecting state" will continue until the plasma recombines or expands and ceases to be superdense. It will be shown below that if the pulse duration is $\tau \lesssim 10^{-11}$ sec, such a reflecting state of the irradiated region of the medium can continue during the entire

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[1] We can apparently disregard the effect of nonlinear absorption in the narrow spectral interval $\lambda \approx \lambda_p$ (see [5]) and the nonlinear penetration of the wave into the superdense plasma (see [6]).

pulse duration, and the pulse should therefore experience total reflection. We present the necessary quantitative estimates.

First, using a typical condensed-medium density $n_a = 5 \times 10^{22}$ cm^{-3}, condition (1) yields $\lambda > 0.15$ μ, i.e., the considered effect should be observable at any rate in the near UV and at longer wavelengths. Further, the radiation intensity I should be large enough to cause the corresponding wave amplitude $E_0 = (8\pi I/c)^{1/2}$ to satisfy the condition

$$E_o >> \frac{2\omega\sqrt{m\Delta}}{e} \sim \frac{\omega}{\omega_a} E_a, \tag{2}$$

where ω is the cyclic frequency of the wave, e and m the charge and mass of the electron, Δ the potential of the first ionization of the atoms of the medium, $\omega_a = \Delta/h$, and $E_a \sim \Delta^2/e^3$ the intensity of the atomic electrostatic field. Under condition (2), the atoms become ionized as a result of the tunnel effect within a time on the order of the period of the light wave [1, 2]. In the optical band we have $\omega/\omega_a \sim 0.1$ and we can therefore assume that condition (2) is satisfied if $E_0 > E_a$. For neodymium-laser radiation ($\lambda = 1.06$ μ) at $\Delta = 10$ eV condition (2) calls for a radiation intensity $I >> 10^{14}$ W/cm^2. The order of magnitude of the electron temperature T_e of the produced superdense plasma is given by the condition

$$T_e \sim \frac{e^2 E_o^2}{4m\omega^2} \nu_{\text{eff}} \omega^{-1}, \tag{3}$$

where ν_{eff} is the effective frequency of the Coulomb collisions of electrons with vibrational velocity $v_{\text{vib}} = eE_0/m\omega$, i.e.,

$$\nu_{\text{eff}} = 2\pi\left(\frac{e^2}{mv^2_{\text{vib}}}\right) L n_a v_{\text{vib}} \tag{4}$$

(L is the Coulomb logarithm). With accuracy sufficient for our estimates, we can put $2\pi L n_a \sim (e^2/\Delta)^{-3}$. We then obtain

$$\nu_{\text{eff}} \sim \omega\left(\frac{\omega}{\omega_a}\right)^2\left(\frac{E_a}{E_9}\right)^3. \tag{5}$$

On the basis of (3) and (5) we get $T_e \sim \Delta$ when $E_0 \sim E_a$.

At temperatures $T_e \sim 10$ eV and electron densities $n_e \sim 10^{22}$ cm^{-3}, recombination in the plasma should be due to triple collisions. The recombination time t_{rec} needed for the electron density to decrease from a value $n_e \sim n_a$ to the critical value $n_{e.cr} = mc^2/e^2\lambda^2$ is given by the formula

$$t_{\text{rec}} = (2\beta n^2_{e\,\text{cr}})^{-1}, \qquad (n_{e\,\text{cr}} << n_a), \tag{6}$$

where β is the triple-recombination coefficient at the start of the recombination process i.e., when $n_e \sim n_a$ and $T_e \sim \Delta$). This formula yields for t_{rec} a lower bound, since triple recombination is accompanied by electron heating, and accordingly β decreases with decreasing n_e. Taking into account this character of the estimate (7), we can determine β by using the results of [3], which strictly speaking are valid only if $T_e << \Delta$, and put

$$\beta = 8{,}8 \cdot 10^{-27} T_e^{-9/2} \; [\mathrm{cm}^6 \mathrm{sec}^{-1} \mathrm{eV}^{9/2}].$$

We then obtain $T_{rec} > 10^{-11}$ sec ($T_e \sim 10$ eV, $\lambda = 1.06\ \mu$). It is easy to see that the expansion of a plasma volume of 10^{-6} cm^3 and larger to a density $n_e \sim n_{e.cr}$ is even slower and can be disregarded. Finally, let us estimate the thermalization time of t_{ie} of the electrons and ions. According to [4]

$$t_{ie} \approx \frac{10^{13} A}{n_e L} T_e^{3/2},$$

where A is the atomic weight of the medium and T_e is in keV. At $T_e = 10$ eV and L = 10 this yields $T_{ie} \approx 2 \times 10^{-14}$A sec. Thus, even for heavy atoms the thermalization process is faster than the recombination process. This circumstance, however, should obviously not influence the existence of the predicted effect itself. It may become manifest only in the fact that solids become damaged at the point of focusing (reflection).

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POSSIBILITY OF GENERATING SUB-PICOSECOND PULSES IN STIMULATED RAMAN RADIATION

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We consider in this paper the features of stimulated Raman radiation (SRR) in a gas filling an optical resonator made up of slightly transparent mirrors. It is assumed here that the resonator is excited by an external longitudinal monochromatic beam of given intensity. It is also assumed that the resonator mirrors have good reflection not only at the frequency of the incident beam, but also at the first, second., etc. Stokes frequencies.

The stationary regimes of the optical oscillations in such a resonator, filled with a liquid or solid that is active in the Raman spectrum, were considered in [1, 2]. The distinguishing features of such regimes lie in the fact that the different Stokes components of the SRR interact only as a result of two-photon transitions; there is no parameteric interaction of these components, because the dispersion of the refractive index is sufficiently large in the liquid or solid. Accordingly, the oscillation phases of different Stokes components in the stationary regime are arbitrary and by the same token not connected with one another.

At the same time the dispersion of the refractive index of the gases is sufficiently small. Therefore there will be strong parametric interaction between the different Stokes components in the case of SRR in a gas under the described conditions. We shall show below that in this case the phases of the optical oscillations at different Stokes frequencies will