$\Delta\xi \ll R$ ($\kappa_1 = \kappa$), but also when $\Delta\xi \gg R$ ($\kappa_1 = \frac{3}{4}\kappa$); in the latter case $\Delta\varphi = 4\pi G(1 + \epsilon_1)\rho$, and if $\epsilon_1 \lesssim 1$, then $\epsilon_1 \sim R(\Delta\xi)^{-1} \sim \ell^{-2}(\varphi/c^2)^n$, where φ is the Newton potential. At the given order of magnitude of ℓ, the possibility $\kappa_1 = \kappa$ is excluded (in analogy with the case $r_1 = 0$), and ϵ_1 turns out to be $\sim(a/a_0)^{2n}(\rho/5)^{n-1}\lambda^{-n}10^{-14}$ (ρ is in g/cm^3) and leads to imperceptible (under ordinary conditions) violations of Poisson's equation. Therefore, in a real field

$$\kappa_1 = \frac{3}{4}\kappa \tag{8}$$

and according to (7) the quantity $\delta_m = m_0 m^{-1} - 1$ for the sun has a nonrelativistic order of magnitude (provided only $\delta_\gamma \neq +0.25$, i.e., $\beta \neq 1.31''$, which is apparently excluded with certainty). When $\delta_\gamma = -0.1$ we have $m_0(\odot) = 1.47m(\odot)$ and for all the probable values of δ_γ we have $m_0(\odot) > m(\odot)$.

We see that according to the metric theory δ_γ is due to the inequality of the solar masses. The nonrelativistic nature of δ_m is due to the non-Einstein character of the internal field, which (according to the estimate of ϵ_1) can deviate appreciably from Poisson's equation, remaining at the same time nonrelativistic ($|\varphi| \ll c^2$). Therefore the internal state of the nonrelativistic stars (as well as of the sun) should differ noticeably from the Poisson state. For planets of the solar system $\delta_m \sim \epsilon_1 \ll 1$ (for Jupiter and Saturn $\delta_m \sim 10^{-8}$ and 10^{-9} if $n = 4$ and $\delta_m \sim 10^{-7}$ and 10^{-8} if $n = 5$).

The detailed theory will be published in JETP.

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NONLINEAR NEGATIVE ABSORPTION OF LIGHT IN AN INHOMOGENEOUSLY INVERTED SEMICONDUCTOR

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Certain experimental singularities of the dynamics of the emission of semiconductor lasers [1-5] give grounds for assuming that a semiconductor structure consisting of alternating sections with different positions of the Fermi quasilevels μ (for example, a laser with isolated injection regions [6,7]) constitutes a nonlinear stable medium with negative absorption, similar to the well-known two-component media [8-10], and has the following nonlinearity mechanism.

Light acting on a semiconductor structure which is stable in the initial state causes raising of μ_m in the absorbing section and lowering of μ_n in the amplifying section; this is accompanied by change in the corresponding negative-absorption coefficients g_m and g_n. By virtue of the asymmetry of the frequency dependence of the absorption coefficient, these changes occur, for a specified light frequency ω, at different rates:

$$\frac{dg_m}{dt} > -\frac{dg_n}{dt}.$$

Therefore the total negative-absorption coefficient $g = \gamma_n g_n + \gamma_m g_m$ first increases, until the absorption section is saturated, and then decreases as the amplifying section approaches saturation ($\gamma_m + \gamma_n = 1$ are the relative dimensions of the sections of the structure). Such a behavior is typical of stable two-component media [8-10] and makes it possible to explain the experimental data [1-5].

It can be shown that for a model with a constant density of states ρ_v in the valence band and with an exponential dependence of

$$\rho = \rho_n \exp\frac{E}{E_0}$$

on the energy E in the conduction band [11] at a temperature T = 0, a medium in which

$$g(\hbar\omega) = (cA)^{-1}\{[\gamma_n - \exp(-\frac{\mu_v}{E_0})]\exp\frac{\hbar\omega}{E_0} + \gamma_m \exp\frac{\mu_m}{E_0}\},$$

and its rate of change under the influence of a quasimonochromatic light flux with photon volume density N is

$$\frac{dg}{dt} = \frac{\gamma_m N}{cA^2 E_0 \rho_n}[\exp\frac{\hbar\omega - \mu_v}{E_0} - \exp\frac{\mu_m}{E_0}] > 0,$$

is realized in the energy interval $\mu_m + \mu_v < \hbar\omega < \mu_n$ under the condition $g_0 < \alpha < \gamma_n g_n$, where c is the speed of light in the medium, $A \simeq$ const, μ_m and μ_n are the Fermi quasilevels for electrons, μ_v - for holes reckoned from the ceiling of the valence band, g_0 is the initial value of g, and α is the coefficient of dissipative absorption.

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