antibaryons $\bar{B}$ are quite large compared with the baryon charge $b = B - \bar{B} \sim 10^{-8}(B + \bar{B})$. Such a composition calls for an explanation! For more details see [14].

In the cold model, it is assumed that during the initial stage there are only baryons everywhere, $\bar{B} = 0$, $b = B > 0$.

During the course of the evolution the temperature rises, owing to the anisotropic deformation, and many quanta, e^-, e^+ pairs, and even $B\bar{B}$ pairs are produced. However, an excess of baryons naturally remains, $b = B - \bar{B} > 0$, as is indeed observed [15]. From the point of view of the ordinary isotropic hot model with entropy perturbations, i.e., with $b \neq$ const, the absence of regions with $b < 0$ calls for a special explanation.

Let us note now some unsolved problems which were not touched upon above. During the earliest, quantum stages of the mixmaster model there is possible, in principle, a spontaneous production of particle-antiparticle pairs by a gravitational field, as the result of the rapid change of the metric [16].

It is necessary also to consider the behavior of the rotational and magnetic perturbations in the mixmaster model. The hypotheses advanced above require rigorous proof. Nevertheless, there is no doubt that we are at the beginning of a new stage in cosmology.

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FOCUSING OF LIGHT IN CUBIC MEDIA

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The interpretation of the presently accumulated large experimental material on the destruction of transparent media by focused laser radiation is greatly hindered by the absence of detailed numerical calculations of the picture of its self-focusing, similar to those performed for collimated beams [1 - 3]. Isolated numerical data, given in [4], do not change the overall picture, since they pertain only to two values of the focusing parameter $\nu = ka^2/F$.

In this connection, it is useful to call attention to the fact that there is a one-to-one correspondence between the solutions of the nonlinear-quasi-optics equation for media with a quadratic Kerr effect ($\varepsilon^{NL} = \varepsilon_0(1 + \varepsilon'|E|^2)$):

$$2ik \frac{\partial E(z, r_\perp)}{\partial z} = \Delta_\perp E + k^2 \varepsilon' |E|^2 E \tag{1}$$

in cases of focusing of incident radiation by lenses with different focal lengths F. This correspondence is established by making the change of variables

$$\eta = \frac{zF}{z + F}; \quad \rho_\perp = \frac{\eta}{z} r_\perp$$
$$\tilde{E}(\eta, \rho_\perp) = \frac{z(\eta)}{\eta} E\left(z(\eta), \frac{z(\eta)}{\eta}\rho_\perp\right) e^{-ik\left(1 - \frac{z(\eta)}{\eta}\right)\rho_\perp^2/2\eta} \tag{2}$$

with respect to which Eq. (1) is invariant. The transformation (2) corresponds to the image of the field E(z, r) produced by a thin lens with a focal length F. Thus, there is no need to carry out additional calculations of self-focusing of pre-focused beams for a cubic medium, if the solution of (1) is known for collimated beams having the same transverse structure.

It follows from (2), in particular, that the self-focusing length $\eta_{sf}(F)$ of the pre-focused (or previously defocused) beam satisfies the relation

$$\frac{1}{\eta_{sf}(F)} - \frac{1}{F} = \frac{1}{z_{sf}}, \tag{3}$$

where z_{sf} is the self-focusing length of a collimated beam of the same power. The law (3) for the addition of the optical strengths of linear and nonlinear lenses, known from the theory of aberration-free self-focusing, is consequently valid for arbitrary beams. Since it is satisfied rigorously only in the case of cubic nonlinearity, it can be used for an experimental verification of the character of the nonlinear medium.

It is interesting to trace the motion of the point of convergence z_{sf} as the power radiation of the focused beam is varied. When the power is increased to a value $P > P_{cr}$ (P_{cr} is the critical self-focusing power), the point of convergence z_{sf} of a collimated beam moves from infinity to the forward boundary of the nonlinear meduum. For a collimated beam $E(0,\vec{r}_\perp) = E^*(0,\vec{r}_\perp)$, and consequently, in accordance with (1), $E(-z,\vec{r}_\perp) = E^*(z,\vec{r}_\perp)$. Focusing of such a beam at $P > P_{cr}$ leads to the occurrence of two convergence points, which move away from the focus $\eta = F$ in opposite directions[1)], and with increasing P the rate of motion of the point $\eta^+_{sf} = -Fz_{sf}/(z_{sf} - F) > F$ from the focus is larger than that of the point $\eta^-_{sf} = Fz_{sf}/(F + z_{sf}) < F$[2)]; when $z_{sf} < F$, only one convergence

1)We note in this connection that the occurrence of convergence points of ring zones behind a linear focus, observed in [4], and their approach to the lens with increasing power, contradict the result of [2], where it is indicated that for a collimated beam the convergence points of the ring zones occur at infinity and approach the start of the nonlinear medium with increasing power.
2)It is possible that the difference in the velocities of the sparks emerging from the focus of a lens in the case of breakdown in air is connected with this effect [5].

point $\eta_{sf}^{-} < F$ remains[3]).

Let us list also some applications of the transformation (2). First, it establishes the same rules for the construction of images in a lens for a cubic medium as for a linear medium (within the limits of the validity of Eq. (1)). The transformation (2) is applicable to nonstationary problems if ε^{NL} is a linear time functional of the field intensity (allowance for the relaxation time of the anisotropy, the nonstationary thermal self-focusing ($\Delta\varepsilon^{NL}$, $\int_0^t |E|^2 dt$), etc.)[4]). It is applicable also to problems of frequency mixing by a cubic nonlinearity (for example, to the effect of frequency tripling) in the case of linear synchronism. It follows from it, in particular, that the coefficient of frequency transformation at synchronism in the section from the lens to the focus (the lens is in contact with the nonlinear medium) does not depend on the focal length of the lens, and is equal to the coefficient of frequency conversion in a semi-infinite collimated beam. On the basis of the transformation (2) it is possible to analyze two-photon absorption and stimulated Raman scattering of focused beams.

In conclusion we note that the transformation (2) is not valid in the case of astigmatism of the lens, for example in cylindrical focusing (in the latter case a nonlinearity $\Delta\varepsilon^{NL}|E|^4$ is necessary). It can be used, however, in some cases of space-time focusing of radiation from frequency-modulated ribbon beams in dispersive cubic media.

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REGION OF FORMATION OF INTERNAL CONVERSION COEFFICIENTS ON HIGH SHELLS OF THE ATOM

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The formulas for the calculation of the internal conversion coefficients (ICC), assuming spherical symmetry of the field of the atom, in electric ($\lambda \equiv E$) and magnetic ($\lambda \equiv M$) transitions of a nucleus with multipolarity L, are

$$\alpha^{\lambda L} = \pi k \alpha \Sigma_\kappa B^{\lambda L}_{\kappa\kappa'} \,|\, R^{\lambda L}_{\kappa} |^2 . \tag{1}$$

Here k is the energy of the γ quantum, α is the fine structure, and $\kappa = 1/2$ $(\ell - j)(j + 1/2)$. The unprimed and primed indices pertain to electrons in the

[3])The absence of damage in transparent media behind a linear focus may be attributed to absorption of the power in the vicinity of the first convergence point.
[4])In the case of nonstationary striction self-focusing, the transformation (2) does not hold because of the dependence of the time of establishment of the nonlinearity on the dimensions of the beam cross section.