chenko and the author applied the asymptotic method developed by V. P. Maslov and his coworkers to the solution of the problem, which made it possible to obtain a quasianalytic solution for the field with an arbitrary dependence $\Omega(r,\theta)$. In particular, it was shown that the dependence of Ω, determined from helioseismological data, corresponds best to a solution in the form of two dynamo waves with different amplitudes propagating from some latitude to the equator and the poles.

The intriguing problem of explaining the global activity minima remains unsolved. The appearance of minima is linked with the stochastic nature of the dynamo and the idea of a strange attractor. The first rough models confirm this viewpoint (see the review in Ref. 7), but these are only initial steps.

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M. B. Voloshin, M. I. Vysotskiĭ, and L. B. Okun'. *Possible electromagnetic properties of the neutrino and variations of the solar neutrino flux.* Present limits on the magnetic moment of the neutrino are close to 10^{-10} μ_B ($\mu_B = e\hbar/2m_ec$ is the Bohr magneton). The data obtained by Reines[1] *et al.* on scattering of reactor neutrinos $\bar{\nu}_e$ by electrons imply[2] the limit $\mu_\nu < 2\cdot10^{-10}\mu_B$. The limit $\mu_\nu \lesssim 0.7\times10^{-10}\mu_B$ was obtained from an analysis of the cooling of stars of the young white dwarf type owing to the decay of plasmon into a $\nu\bar{\nu}$ pair.[3]

In the standard $SU(2)\times U(1)$ theory of the electroweak interaction μ_ν is proportional to the neutrino mass m_ν and is extremely small: $\mu_\nu \approx 3\cdot10^{-19}\mu_B$. In extended models, however, for example in the $SU(2)_L \times SU(2)_R \times U(1)$ theory, in which there is a (small) mixing of left- and right-hand W bosons, the magnetic moment of the neutrino is proportional to the given mixing and the mass of the τ lepton and can reach values near $10^{-10}\mu_B$. It has not been excluded that μ_ν of the same order of magnitude can be obtained in extended schemes by other mechanisms also (through charged Higgs bosons, supersymmetric particles, etc.).

Our purpose is to call attention to the fact that the existence of a neutrino magnetic moment $\mu_\nu \sim 10^{-10}\mu_B$ can lead to the existence of specific variations of the experimentally recorded[4] flux of solar neutrinos, correlated with the solar activity. These variations are determined by the interaction of μ_ν with the magnetic field H existing in the so-called convective zone of the sun. The quantity $|\mathbf{H}|$ varies with the 11-year quasiperiodicity and in years with maximum solar activity should reach values characteristic for a magnetic field in solar spots $H \approx (2\text{–}4)\cdot10^3$ G, decreasing by at least an order of magnitude at the minimum of activity. In addition, the field has a toroidal structure (oriented along the azimuth). Taking into account the fact that the depth of the convective zone $L \approx 2\cdot10^{10}$ cm, we find that for $\mu_\nu \approx 10^{-10}\mu_B$ the angle φ of rotation of the spin of the neutrino owing to precession in the field H, $\varphi = \mu HL$, can reach in years of solar activity values of the order of unity. In addition, the flux of left-polarized neutrinos, which is the only one detected experimentally,[4] decreases according to the formula $N_L = N_0\cos^2\varphi$. As a result there arises[5] a variation of the recorded flux which is anticorrelated with the 11-year cycle of solar activity.

Together with this cycle, for high-energy neutrinos, formed in processes including ^{7}Be and ^{8}B, half-year variations[6] of the observed flux should also occur. The latter variations are determined by the fact that the field $\mathbf{H}$ changes sign at the equator and the size of the transitional region between $+\mathbf{H}$ and $-\mathbf{H}$ equals $\pm(5\text{–}7)^\circ$ in latitude, which corresponds to a linear size of $\pm(6\text{–}8)\cdot10^9$ cm—larger than the region in which the high-energy neutrinos are formed ($3\cdot10^9$ cm). Because of the inclination of the earth's orbit relative to the plane of the solar equator (equal to 7°15′) the neutrinos arriving on the earth pass through a region in which the field has different intensity (close to zero) when the earth is located in the plane of the solar equator (at the beginning of June and the beginning of December) and an intensity $\sim H_{\max}$, when the earth is located at its maximum distance from this plane (at the beginning of March and the beginning of September). It is also clear that the half-year modulation of the flux should be maximum during years when the sun is active.

Experimental data[4] indicate that the variations of the neutrino flux discussed above could exist, but the statistical sample for these indications is too small. In this connection, it is of great interest to study the data on variations obtained by the new solar-neutrino detectors which are now under construction. It is important that the collection of data with the improved statistical base should begin by the end of the 1980s, i.e., the beginning of the next expected maximum in the solar activity near 1991.

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Translated by M. E. Alferieff