period P = 53.6 msec. An investigation of the temporal variations of this period has shown relatively long stability of the pulsations of the second class, the phase of which changes by up to 100° within approximately 3000 periods of the second class. This cannot be due to the influence of the interstellar medium on the position of the subpulses in time, since good correlation is observed between the variations at several frequencies simultaneously.

Simultaneous investigations at the frequencies 60, 86, and 110 MHz, carried out at FIAN, have revealed a linear dependence of the width of the radiation diagram (the "window" diagram) of the pulsar CP0088 on the wavelength, as a result of which one frequently observes at 60 MHz three subpulses, whereas at 110 MHz two subpulses are rare. On the basis of the results, the paper discusses two possible models of the distribution of the radio brightness of the emitting region of the pulsar CP0808.

Yu. L. Alekseev, V. V. Vitkevich, V. F. Zhuravlev, and Yu. P. Shitov. The New Pulsar PP0943.

The communication gives data on the new pulsar PP0943, discovered by the authors in December 1968 at the Radio Astronomical Station of FIAN in Pushchino. The main parameters of the pulsar PP093 are: direct ascension $9^h 43^m 15^s \pm 30^s$, declination approximately 8°, average period 1.09 ± 0.003 sec, total number of electrons on the line of sight 17.5 psec-cm^3. The shifts of the pulsar pulses relative to the average period suggests the existence of a period of second class with a value approximately 60 msec.

V. V. Vitkevich, N. A. Lotova, Yu. P. Shitov, and V. I. Shishov. Pulsar Flicker Due to the Inhomogeneities of the Interstellar Plasma.

The paper discusses the flicker of pulsars (particularly CP0808), which is manifest by the presence of a frequency fine structure. The characteristic frequency scale of the fine spectral structure depends on the frequency more weakly than ν^4, this dependence is predicted by the theory). The observed flicker characteristics are used to estimate the parameter of the inhomogeneities of the interstellar plasma, namely, the characteristic dimension of the inhomogeneities is $\sim 10^{12}$ cm and the characteristic value of the fluctuations of the electron density $\Delta N_e \sim 10^{-4}$ electron/cm^3.

A. A. Stepanyan, B. M. Vladimirskiĭ, I. V. Pavlov, and V. P. Fomin. Possible Existence of a Flux of $10^{13}\cdot$eV γ Quanta from the Pulsar CP1133.

Several attempts were made recently to observe high-energy γ quanta from pulsars in installations registering the flashes of Cerenkov radiation from extensive air showers. In[1] is discussed the increase of the intensity in the direction to the pulsar CP1133, and the magnitude of the effect amounts to ~100 ± 35% (the flux for the energy $\geq 3 \times 10^{12}$ V is approximately 5×10^{-11} cm^{-2} sec^{-1}). An indication of the presence of an effect from the same object was obtained in[2] for an energy $\geq 10^{14}$ eV. The measurements[3] have shown, however, that no γ-quantum flux from CP1133 is observed within the limits of errors.

In March—April 1969, measurements were made of the proposed flux of γ quanta from the pulsars CP1133 and HP1507 at the Crimean Astrophysical Observatory (CAO) of the USSR Academy of Sciences. Four detectors were used. The CAO detectors constitute parabolic mirrors with diameter 1.5 m at a focal length 650 mm. At the focus is placed a photomultiplier (FÉU-52). The solid angle of the field of view is 10^{-3} sr. The detectors are connected pairwise for coincidence. The resolution time of the coincidence circuit is 5 nsec. The average counting rate of the showers for one pair of detectors is 15—25 per minute. The photomultiplier current due to the glow of the night sky is stabilized. The end-point energy of the shower registration is $\sim 10^{13}$ eV. The proposed stars passed successively through the fields of view of immobile detector pairs. Eight such "scannings" were carried out for the pulsar CP1133 and four for HP1507. The average counting rate as the source passed through the field of view of the receiver was compared with the average counting rate in the absence of a source in the field of view, i.e., with the background. An increase of the intensity by 7 ± 3% was observed in the direction towards the pulsar CP1133. This measurable effect was not observed (1.5 ± 9%) for the pulsar HP1507. Since the apparatus used by the different authors differs somewhat in its characteristics, and since the measurement accuracy is insufficient, it is difficult to decide at present the cause of the results obtained so far.

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L. M. Erukhimov. Oscillations of Pulsar Radio Emission.

The paper discusses the influence of the effective propagation of radio waves in the interstellar medium in the "corona" of the pulsar on the characteristics of its radio emission[1,2,4,5]. In[1,2] there were considered the expected characteristic intensity fluctuations of the radio emission scattered by the inhomogeneities of the interstellar plasma. The same references have shown that the minute variations (MV) of the radio emission from the pulsars, with durations $\tau \sim 1$—10^4 minutes, and the variations of their radiation with $\tau_0 \sim 1$—30 days can be due to the inhomogeneities of the interstellar medium with dimensions $l \sim 10^{19}$—10^{14} cm. The MV of the interstellar origin should in this case have a small frequency correlation radius $\Delta\nu$; this radius depends on the parameters of the interstellar medium (in particular, on the integral concentration N_{tot} of the electrons to the pulsar) and increases with increasing duration τ of the variations. The recently obtained experimental relation[3] $\Delta\nu \propto N_{tot}^{-2}$ agrees with the results of[1,2]. At the same time, an analysis[4] of the experimental data has shown that the duration τ of the MV can also depend strongly on N_{tot} and on the working frequency ν ($\tau \propto N_{tot}^{-n}\nu^{k}$, n ~ 1–2, k ~ 2–3). Such a variation of ν, in particular, can be explained by taking into account the influence exerted on the MV (which are due to inhomogeneities with dimensions $l \sim 10^{10}$–10^{11} cm) of larger inhomogeneities with $l \sim (1-5) \times 10^{13}$ cm, which move (relative to the smaller inhomogeneities and to the source) with a velocity $v \gtrsim 5 \times 10^{7}$ cm/sec and are responsible in turn for the oscillations of the intensity of the pulsar radio emission with $\tau_0 \sim 10^{5}$–10^{6} sec[4]. Better agreement with the set of data on MV is obtained in this case under the assumption that the main contribution to the variations is made by inhomogeneities lying in the HII regions surrounding the pulsars.

The possible influence of the inhomogeneities of the pulsar "corona" on the intensity fluctuations, the fine structure, and the waveform of the emission pulses of the pulsars[5] is considered. It is shown that in a number of cases the characteristics of the signal scattered in the pulsar corona can depend very little on the frequency (for example, if the radiation is produced or is reflected from levels where the frequency is close to the plasma frequency, and the change of the plasma concentration with altitude is nearly exponential). It is noted that under certain assumptions concerning the character of the emission in a statistically-inhomogeneous medium, the oscillations of the radiation intensities of the pulsars with characteristic times $\tau \lesssim 1$ sec can have a logarithmic-normal distribution.

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V. V. Zheleznyakov. Mechanisms of Pulsar Radiation.

In explaining the radio emission of pulses, and in the case of the NP0532 pulsar in the Crab Nebula also the optical and x-ray emission, the starting point is the quite plausible assumption that the pulsar is a rotating dense (neutron) star with a strong magnetic field. The mechanism of the radio emission with $T_{eff} \sim 10^{21}$°K should be coherent, for otherwise the required particles have an energy $\mathcal{E} \gtrsim 10^{17}$ eV and conditions are necessary under which the maximum of their radiation lies in the radio band. For the optical ($T_{eff} \sim 10^{12}$°K) and x-ray band, there is no such need, and $\mathcal{E} \sim 10^{8}$ eV is sufficient. The optical and x-ray emissions are certainly not produced in the hot isotropic photosphere; in that case the emission would be nondirectional and the rotation of the star would not lead to the appearance of pulses.

In the model proposed by V. L. Ginzburg, V. V. Zaĭtsev, and the author[1], the emission of the NP0532 pulsar is attributed to the synchrotron mechanism; the emission comes from relativistic particles contained in the radiation belts of the star. The observed level of the optical radiation ($f \sim 5 \times 10^{14}$ Hz) can then be attributed to incoherent synchrotron radiation of electrons with energy $\mathcal{E}_0 \sim 10^{2}$ mc^2 and concentration $N_0 \sim 5 \times 10^{15}$ electrons/cm^3, concentrated in a volume $V \sim 10^{19}$ cm^3 (magnetic field $H \sim 2 \times 10^{6}$ Oe). We then have the parameter $\delta = H^2/8\mathcal{E}_0 N_0 \sim 1$, the optical thickness of the system is $\mu L \sim 1$, and the maximum of the radiation occurs at a frequency $f_{max} \sim 5 \times 10^{16}$ Hz. The lifetime of the electron relative to the synchrotron loss is $t_m \sim 10^{-6}$ sec*. It is important that the radiation power of the same electrons at frequencies $\sim 10^{18}$ Hz suffices to explain the radiation in the x-ray band. The character of the frequency spectrum (for the simplest monoenergetic spectrum of the electrons) correspond qualitatively to that observed: it is gently sloping for the optical band (the spectral index is $\alpha = -1/3$) and drops off for the x-rays, although too steeply ($\alpha \approx 4.5$).

For the coherent synchrotron mechanism in the radio band ($f \sim 3 \times 10^{8}$ Hz), the following are the optimal parameters of a system with $\delta \sim 1$ and a linear dimension $L \sim 10^{8}$ cm: $N_0 \sim 10^{7}$ electrons/cm^3, $\mathcal{E}_0 \sim 7.5$ mc^2, $H \sim 30$ Oe, concentration of "cold" (nonrelativistic) plasma $N \sim 3 \times 10^{8}$ electrons/cm^3, and its temperature $T \sim 10^{4}$°K. The amplification over a system dimension $\mu L \sim 40$ suffices to account (without taking the saturation into account) for the radio emission of the observed intensity.

For a dipole magnetic field ($H \backsim 1/R^3$, R—distance from the center of the star), the ratio of the magnetic fields in the shortness of the optical and radio radiation is characterized by the ratio of the radii of these sources $R_{rad}/R_{opt} \sim 50$. The value of R_{rad} for the pulsar NP0532 is limited to 10^{8} cm, which is determined by the width of the pulse 3 msec. If $R_{rad} \approx 10^{8}$ cm, then $R_{opt} \approx 2 \times 10^{6}$ cm. Thus, the optical and x-radiation come from the nearest vicinity of the neutron star, and the value $H \sim 2 \times 10^{6}$ Oe in the stars yields an estimate of the magnetic field H_0 on the surface of the star (it is probable that H_Z is somewhat larger; if the neutron-star radius is $R_0 \sim 10^{6}$ cm, then $H_0 \sim 10^{7}$ Oe).

If the relativistic electrons are localized near the surface of the magnetic equator and have a momentum distribution in the angle interval $\Delta\theta \sim 20$–$40°$, in which the magnetic equator is included, then the directivity pattern of the radiation becomes "knife-like" (with an aperture $\Delta\theta$), and the duration $\Delta\tau$ of the pulses produced upon rotation of the pulsar will

*Owing to the high radiation energy density, an important role in the magnetosphere of the pulsars may be played by the inverse Compton effect. In certain cases (as noted by I. S. Shklovskiĭ during the discussion of the paper) the magnitude of the Compton loss may exceed the synchrotron radiation loss. The latter pertains also to the model in question with the indicated parameters, at which the Compton loss decreases the lifetime of the electrons to 10^{-7} sec. The average energy of the Compton quanta then amounts to 2×10^{6} eV. The power of the γ rays produced in this case reaches 10^{37} erg/sec. At the same time, it is possible to choose the model parameters such that the power of the γ rays is greatly reduced. It is clear therefore that measurement of the γ-ray flux from the pulsar NPO532 will make it possible to evaluate more definitely the physical characteristics of the radiating region.