[1]R. E. Nather, B. Warner, and M. MacFarlane, Nature 221, 527 (1969).
[2]L. Woltjer, Bull. Astron. Inst. Netherlands 13, 301 (1957).
[3]V. I. Pronik, I. I. Pronik, and K. K. Chuvaev, Astron. Tsirk. No. 502, 1 (1969).
[4]R. Lynds, S. P. Maran, and D. E. Trumbo, Astrophys. J. 155, L121 (1969).
[5]A. Behr, Nachr. Akad. Wiss. Göttingen, II. math.-phys. Kl., Nr. 7, 185 (1959).
[6]G. V. Coyne and T. Gehrels, Astrophys. J. 71, 355 (1966); 72, 887 (1967).
[7]B. Warner, R. E. Nather, and M. MacFarlane, Nature 222, 223 (1969).
[8]K. C. Freeman, A. W. Rodgers, P. T. Rudge, and G. Lynga, Nature 222, 459 (1969).

V. I. Pronik, I. I. Pronik, and K. K. Chuvaev. Distribution of the Energy in the Spectrum of the P Pulsar of the Crab Nebula.

In February—March of this year, an attempt was made at the Crimean Astrophysical Observatory of the USSR Academy of Sciences to obtain the distribution of the energy in the spectrum of the pulsar NP0532 in the optical range. The observational material constitute the ordinary photographs of the Crab Nebula, obtained with the ZTSh telescope with different filters having λ_{eff} from 3600 to 7400 Å, and exposures from several seconds to several minutes. From the photographs obtained in February, we estimated the brightness of the pulsar at different wavelengths relative to the brightness of the nearest northern star (spectral class G), and found that besides the ultraviolet excess in the spectrum of the pulsar, there is apparently an excess of radiation also in the near infrared region. At the beginning of March, using the ZTSh telescope, photographs of the pulsar, of very good quality, were again obtained. In order to eliminate the influence of the gas flocculi projecting from the pulsar, the photographs taken with filters that transmit the emission lines of the flocculi were not processed. The brightness of the pulsar in each filter was determined relative to the brightness of the adjacent background of the nebula, the spectrum of which was assumed to be equal to the spectrum of the nebula as a whole. The latter was constructed from the observation data of various authors (○—[1], □—[2], •—[3]), and is shown in Fig. 1. Observations in the infrared region of the spectrum are presented only to verify that the break of the spectrum, near λ 5500 Å, actually exists. Figure 2 the spectrum of the pulsar (2): the light circles represent our measurements of the pulsar with different filters relative to the nebula, pertaining to the summary effect from both pulses; the dark circles are the measurements of Oke[4], pertaining to the principal pulse. For comparison, the same figure shows the integral spectrum of the Crab Nebula (1) and the spectrum of the background of the nebula under the pulsar, measured by Oke at the instants between the pulses (3). The deviation of the designated points on curve 3 gives an idea of the intensities of the lines in the spectrum of the gas flocculi projecting from the pulsar. The zero point of the vertical scale differs for the different curves. The good

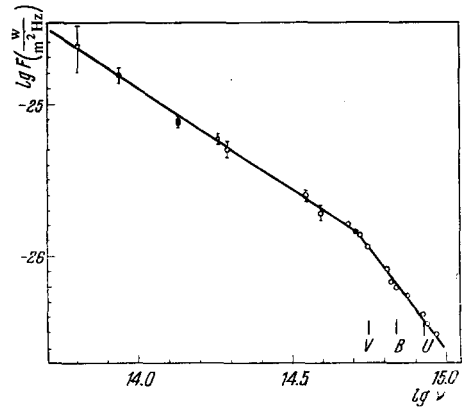

FIG. 1. $\alpha = -1.3$ for the upper left part of the curve, and $\alpha = -2.8$ for the lower right.

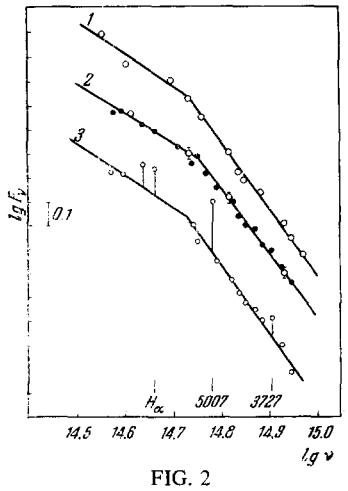

FIG. 2

agreement between our results and the results of Oke confirms the correctness of the assumption made above, namely that the spectrum of the background from the nebula near the pulsar is the same as the spectrum of the Crab Nebula as a whole. It is clearly seen in Fig. 2 that the spectrum of the pulsar in the optical band is identical to the spectrum of the Crab Nebula, with the only possible slight difference that the spectrum of the pulsar is shifted relative to the spectrum of the nebula towards higher frequencies by an amount $\Delta \log \nu \sim 0.025$.

[1]C. R. O'Dell, Astrophys. J. 136, 809 (1962).
[2]E. E. Becklin and D. E. Kleinman, Astrophys. J. 152, 391 (1968).
[3]E. P. Ney and W. A. Stein, Astrophys. J. 152, 383 (1968).
[4]J. B. Oke, Astrophys. J. 156, L49 (1969).

Yu. I. Alekseev, V. V. Vitkevich, and Yu. P. Shitov, Fine Structure of the Pulses of the Pulsar CP0808 and Variation of the Periods of the Second Class

The paper reports a discovery, made at the Radio Astronomical Station of FIAN, that the pulsar CP0808 has periodic pulsations of the second class, with a

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 $9^h43^m15^s \pm 30^s$, 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}·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.

[1] E. P. O. Mongain, N. A. Porter, J. White, D. J. Fegan, D. M. Jennings, and B. G. Lawless, Nature **219**, 1348 (1968).

[2] W. N. Charman, J. V. Jelley, P. R. Orman, R. W. P. Drever, and B. McBreen, Nature **220**, 565 (1968).

[3] G. G. Fazio, H. F. Helmken, G. H. Rieke, and T. C. Weekes, Nature **220**, 892 (1968).

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 work-