"Razdan-3," the data processing was carried out. Measurements at a fringe width $\Delta = 0.15$ ($d/\lambda = 1.3\times10^6$) have been carried out jointly with the Crimean Astronomical Observatory (CAO) at 75-cm wavelength with a 1100-km base line from Byurakan to Simeiz. The results of these measurements are compared in Table II with the data of other authors for the same wavelength. It can be seen from the table that the dimensions of the sources for comparable spatial frequencies d/λ are practically the same for significantly different directions of the cross section of the source (different position angles). It is shown that these sources are practically symmetric.

The main development of interferometry abroad is in the direction of trying to resolve finer and finer details by increasing d to the earth's diameter and decreasing the wavelength. In the USSR investigations at meter and decameter wavelengths are being developed. The importance of this direction is obvious, since it brings in data on extended source structures like the halo or the envelopes of supernovae, etc. At the same time, measurements at ultrashort and decameter wavelengths yield information on the inhomogeneities of the structure of the interstellar and intergalactic media. The interferometric investigations with independent reception at decameter wavelengths were begun at GRRI in 1971, and the dimensions of the remnants of the supernova Cassiopeia A have already been measured at 33-m wavelength (9 MHz). Notice that measurements of the dimensions of this supernova had not been extended below 100 MHz, with the exception of a single measurement at 15-m wavelength carried out in 1959 with the aid of a radio interferometer[7]. The author of this work found the dimension of this source to be equal to 9 and infers the existence of a large halo around the source. Measurements in the 33-m band presented great difficulties because of the amplitude and phase scintillations of the source. The observations were carried out at a time when the critical frequencies of the ionosphere were not higher than 2–3 MHz. The mean of several hundred measurements showed that the apparent dimensions of Cassiopeia A at 33-m wavelength are $8.5'\pm1'$. However, this two-fold increase in the dimensions as compared to the dimensions for decimeter waves is, as analysis of the measurements showed, most probably connected with diffraction by the inhomogeneities of the ionosphere. The proper dimensions of Cassiopeia A turned out to be roughly equal to $5'\pm1'$. The increase by 1 in the dimension can be explained by scattering in the interplanetary medium.

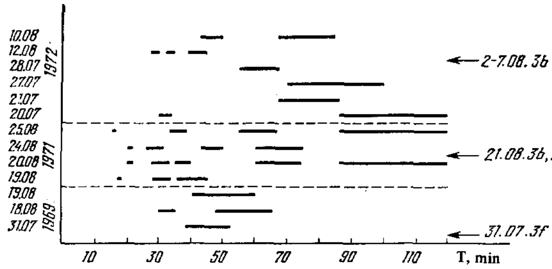
Thus, the boundary of the supernova's envelope turns out apparently to be the same in the centimeter-decameter wave band. The measurements on Cassiopeia A are now continuing at frequencies of 6, 9, 13, and 25 MHz. Between February and March, 1971, the Institute of Radio Engineering and Radioelectronics of the Academy of Sciences of the Ukrainian SSR (Khar'kov) carried out measurements at a frequency of 25 MHz on a number of quasi-stellar sources, using the UTR-2 antenna with a 900-km, Gor'kiĭ-Khar'kov base line. An attempt was made to measure the angular dimensions of the sources 3C 196, 254, 273, and 144 (the Crab nebula). Interference was observed from only the Crab nebula, and then only during 1% of the observational time of 630 sec. This is connected with the poor state of the ionosphere during the period of observation*).

In 1969 and 1971 Soviet-American measurements of the dimensions of the compact parts of sources were carried out with a Simeiz-Green Bank base line at 6-, 2.7-, and 1.35-cm wavelengths. The Soviet part of the measurements were performed by the ASPI, the Institute of Cosmic Research, CAO, and others. The apparatus used in these measurements was brought from the USA, and the data was processed on American computers[8] Compact sources of dimension less than 0.3 μsec have been shown to exist.

[1]V. A. Alekseev, É. D. Gatélyuk, V. D. Krotikov, V. N. Nikonov, V. S. Troitskiĭ, and A. I. Chikin, Izv. Vuzov (Radiofizika) **13**, 5 (1970) [Radiophysics & Quantum Electronics **13**, 1 (1972)].
[2]V. A. Alekseev, M. A. Antonets, V. V. Vitkevich, É. D. Gatélyuk, P. S. Zhivora, V. D. Krotikov, A. E. Kryukov, V. S. Troitskiĭ, A. I. Chikin, V. A. Shemagin, M. V. Yankavtsev, and B. P. Fateev, ibid. **14**, 1303 (1971).
[3]W. Donaldson, G. K. Miley, H. P. Palmer, and H. Smith, Mon. Not. RAS **146**, 213 (1969).
[4]J. P. Bosart, B. G. Clark, and I. S. Kromer, Publ. Astron. Soc. Pacific **86**, 273, 474 (1968).
[5]N. W. Broten, R. W. Clarke, T. H. Legg, J. L. Locke, T. A. Calt, J. L. Yen, and R. M. Chisholm, Mon. Not. RAS **146**, 313 (1969); R. W. Clarke, N. W. Broten, T. H. Legg, J. L. Locke, and J. L. Yen, ibid., p. 381.
[6]B. G. Clarke, K. I. Kellerman, C. C. Bare, M. H. Cohen, and D. L. Jauncey, Astrophys. j. **153**, 705 (1968).
[7]G. Beber, J. Geophys. Rev. **64**, 287 (1969).
[8]K. I. Kellerman, D. L. Jauncey, M. H. Cohen, B. B. Shaffer, B. G. Clark, J. Broderick, B. Rönnang, O. F. H. Rydebeck, L. Matveyenko, I. Moiseyev, V. V. Vitkevitch, B. F. C. Cooper, and R. Batchelor, Astrophys. J. **169** (No. 1, Pt. 1), 1 (1971).

M. M. Kobrin, A. I. Korshunov, and V. V. Pakhomov. Quasiperiodic Components in the Fluctuations of the Solar Radio-frequency Radiation. Investigations of the fluctuations in the radio emission of the Sun that were carried out at Gor'kiĭ Radiophysics Research Institute (GRRI) led to the discovery in 1964 of quasiperiodic components (QPC) in the intensity spectrum of the radio emission of the sun with periods of about 300 sec and intensities of up to 2% of the sun's radiation. Further investigations that were carried out on special radiotelescopes, using a quasinull method, allowed the detection of a whole series of QPC with periods of from 100 to 1000 sec and the demonstration of their solar origin. The QPC were detected (in the absence of bursts of radio emission) at 8-mm wavelength as well as at 2-, 3-, 10-, 30-, and 60-cm wavelengths and in the polarization at 3.3-cm wavelength. A connection between QPC of periods T = 180 and 600–900 sec and the active regions was discovered at 8-mm wavelength on the ASPI 22-m radiotelescope. The periods of the QPC detected in the radio emission coincided with the periods of the QPC of the velocity field and the intensity of radiation that have been determined by optical methods for the photosphere and the lower chromosphere.

The existence of QPC was confirmed by a number of authors (Gel'freĭkh, Simon-Shimabukuro, and others). Experiments performed in 1971 with radiotelescopes separated by a distance of 1500 km confirmed the main characteristics of the QPC in the indicated band. Starting from 1969, investigations of the fluctuations were carried out with the object of studying the long-period QPC with periods longer than 1000 sec. In 1969 QPC with periods of 33 and 50 min were discovered at 3-cm wavelength. The possibility of detecting the modulation



of the radio-frequency radiation by the natural mechanical oscillations of the sun was postulated, and the pertinent computations were carried out. Later, analogous periods were detected in the photosphere.

In 1971 and 1972 special experiments at 3-cm wavelength were set up with spaced telescopes: Gor'kiĭ-Kislovodsk and Gor'kiĭ-Chukotka.

The figure shows the experimental data on the spectra of the intensity fluctuations of the radio emission in 1969, 1971, and 1972. The horizontal lines for the respective dates indicate the presence and width of the peaks in the observed spectra (within the limits of the confidence interval). The data with arrows indicate the presence and class of high-power chromospheric flares. The presence of an entire QPC series with periods of from 10 to 120 min can be seen in the figure. The periods obtained turned out to be in good agreement with the periods of the Alfvên waves detected in the solar wind.

We can on the basis of the expounded material draw the following conclusions:

1) QPC with periods of from 100 sec to 2 hours was detected in the radio emission of the sun. This was, to the best of our judgement, the first experimental confirmation of the presence of wave motions in the sun's corona. The study of these motions may help solve the problem of the heating of the corona and the problem of energy transport to the solar wind.

2) The discrete character of the spectrum of the fluctuations in the radio-frequency radiation is a reflection of the presence of natural frequencies of the discrete spatial structures existing in the sun's atmosphere. The study of the QPC opens up the possibility of studying these structures, their parameters and the dynamics of the processes taking place in them. In the event of detection of the natural oscillations of the sun, the possibility of studying its internal structure will open up.

3) The existence of a connection between the QPC and the sun's activity (the amplitude of the individual QPC with, in particular, periods of 180 and 600–900 sec) permits us to hope that new information on the active regions will be obtained. It is to be hoped that the study of QPC will yield new data for forecasting solar activity.

4) The presence of waves in the sun's atmosphere affects the modulation of not only the optical and radio-frequency radiations and the solar wind, but, obviously, the x-ray and ultraviolet radiations as well. Therefore, the study of these wave motions is undoubtedly of interest not only for solar physics, but also for the physics of interplanetary space and geophysics.

The material of the report has been published in the papers: M. M. Kobrin, A. I. Korshunov, and A. I. Chandaev, Astron. Tsirk. No. 575, 1 (1970); M. S. Durasova, M. M. Kobrin, and O. O. Yudin, Nature **229** (5282), 83 (1971); M. M. Kobrin, Sbornik dokladov sessii Nauchnogo soveta no kompleksnoĭ probleme "Radioastronomiya" (The Collected Reports of the Session of the Scientific Committee on the Comprehensive Problem of "Radioastronomy") (IZMIRAN, October 13–16, 1970), IZMIRAN, M., 1972; M. M. Kobrin and A. I. Korshunov, Solar Physics **25**, 339 (1972); V. I. Aleshin, M. M. Kobrin, and A. I. Korshunov, Izv. Vuzov (Radiofizika) **16** (1973); M. M. Kobrin, V. V. Pakhomov, M. S. Durasova, B. V. Timofeev, N. A. Prokof'eva, E. I. Lebedev, G. A. Lavrinov, ibid.; V. V. Pakhomov and S. D. Snegirev, Astron. Tsirk. (1973).

Yu. P. Shitov. Pulsar Observations at the Radioastronomical Station of the USSR Academy of Sciences Physics Institute. Investigations of pulsars at the Radioastronomical station (RAS) of the USSR Academy of Sciences Physics Institute (FIAN) were begun immediately after the report of their discovery in the spring of 1968. These investigations, which were begun on the initiative, and with the direct participation of V. V. Vitkevich, are going on well at present. The observations on the radio emission of pulsars are being carried out on the DKR-1000 radiotelescope (on the east-west antenna) in the 10-120 MHz band, using several specialized multichannel radiometers. During the last two years (1971–1972) the staff of the Astronomy Laboratory of the FIAN have obtained a number of important new results in the investigation of the pulsars themselves, as well as of their interstellar plasma.

1. Of great interest are the pulsars which emit complexly-shaped pulses consisting of two or more subpulses. The question arises with respect to these pulsars: is the complex pulse structure due to the corresponding complex shape of the directional diagram of the radio-emitting region, or is it that to each subpulse corresponds its own independent region of emission?

Investigations of the pulsar CP 1133 showed that its radio-frequency radiation subpulses I and II possess substantially different amplitude-time and polarization characteristics. It is inferred from this that the subpulses I and II are emitted by separate independent active regions located at an angular distance of ≈12° apart in the pulsar[1,2]. An analogous conclusion can apparently be drawn about other similar pulsars—AP 1237, PSR 2045, NP 0525, etc.

2. A special place is occupied by pulsars possessing the so-called periodicity of the second class[3]. A typical representative of this type of pulsars is the pulsar CP 0808, whose subpulses execute a regular drift inside the radio-emission window[4]. There are two models explaining the drift of the subpulses: a) the pulsating-rotational model[3] and b) the model with a differential revolution of the radio-emitting regions relative to the surface of the neutron star[5]; there was not until recently an unambiguous, conclusive argument in favor of one or the other model. A detailed analysis of the periodic process of the second class occurring on the pulsar CP 0808 showed that in a number of cases the interdependence $P = 24P_1P_3/(P_1 + 24P_3)$ of the periods P, P_1, P_3, which has to be satisfied in the pulsating-rotational model is clearly violated. Thus, in fact, the drift of the subpulses of the pulsar CP 0808 (apparently, of other similar pulsars as well) is due to the differential revolution of the radio-emitting regions (rotation of