



THE FIFTH G. GAMOW'S ODESSA ASTRONOMICAL SUMMER SCHOOL

August, 15-20, 2005



PROGRAM AND ABSTRACTS

Odessa, Ukraine

THE FIFTH G. GAMOW'S ODESSA ASTRONOMICAL SUMMER SCHOOL

«*Astronomy and beyond: Astrophysics, Radioastronomy, Cosmology
and Astrobiology*»

(Ukraine, Odessa, Chernomorka, 15-20 August, 2005)

SCIENTIFIC PROGRAM

Monday, August 15

THE DAY OF ARRIVAL

8.00-22.00. REGISTRATION OF PARTICIPANTS

14.00-16.00. RADIOASTRONOMY SECTION

14.00-14.40. V.N. Melnik, A.A. Konovalenko, H.O. Rucker, E.P. Abranin, V.V. Dorovskyy, A. Lecacheux, A.A. Stanislavsky: "SOLAR SPORADIC RADIO EMISSION AT THE DECAMETRIC WAVES".

14.40-16.00. DISCUSSION

19.30-21.00. MUSIC CONCERT

Tuesday, August 16

10:00. OPENING SUMMER SCHOOL

10:00-10:15. V.A. Smyntyna (Rector of the Odessa National University (ONU), Ukraine): "140-TH ANNIVERSARY OF ODESSA NATIONAL UNIVERSITY".

10.15-10.30. V.G. Karetnikov (Director of Odessa astronomical observatory ONU): "125-TH ANNIVERSARY OF ACADEMIC, PROFESSOR A.Y.ORLOV - THE EMINENT SCIENTIST, ORGANIZER AND POPULARIZATOR".

10.30-10.45. M.I. Ryabov (Chairman of Odessa astronomical society, Odessa Observatory of the Radioastronomical Institute, NANU): "GAMOW'S DAYS IN ODESSA".

MORNING LECTURES (2 lecture x 45 min)

Geodynamics:

10:45-11:35. Ya.S. Yatskiv (Academic, Prezident of Ukrainian Astronomical Association (MAO NANU), Kiev, Ukraine): "MODERN THEORY OF THE EARTH'S NUTATION".

11.40-12.00.

Astrophysics:

12.00-12.45. A.M. Cherepashchuk (Vice-president of European Astronomical Society, GAIH, MGU): "ETYMOLOGY OF BLACK HOLE".

13:00-14:00. LUNCH

AFTERNOON SESSIONS

Radioastronomy:

15.00-18.00. (9 reports)

15.00-15.20.

1. *V. Shepelev* (IRA NAS Ukraine): “**PRESENT STATE AND FUTURE OF THE INTERFEROMETER NETWORK URAN. NEW EQUIPMENT AND METHODS**”.

15.20-15.35.

2. *A.I. Brazhenko, E.P. Abranin, A.V. Frantsuzenko, A.A. Konovalenko, A. Lecacheux, V.N. Mel'nik, H. Rucker, R.V. Vashchishin*: “**RADIOPOLARIMETER URAN-2, PRELIMINARY RESULTS OF THE SUN OBSERVATIONS**”.

15.35-15.50.

3. *P.I.Fomin, A.P.Fomina*: “**THE FORMULA FOR RELATIVISTIC JET ACTIVITY OF QUASARS AND RADIO GALAXIES**”.

15.50-16.05.

4. *R. Vashchishin*: “**FLUCTUATIONS OF A CIRCULAR POLARIZATION DEGREE OF RADIATION FROM RADIOSOURCES**”.

16.05-16.25. COFFEE AND COLD WATER BREAK

16.25-16.40.

5. *O. Ulyanov, V. Zakharenko, A. Deshpande, A. Asgekar*: “**SIMULTANEOUS OBSERVATIONS OF SIX PULSARS AT FREQUENCIES 23.7 MHz & 34.5 MHz USING UTR-2 AND GEETEE RADIO TELESCOPES**”.

16.40-16.55.

6. *A. Lozynskyy*: “**CONVERTING THE MODULATION CHANNEL OF SYSTEM URAN RADIO TELESCOPES TO A COMPLEX CORRELATION RADIOMETER**”.

16.55-17.15.

7. *V. G. Derevyagin, E. A. Isaeva, R. O. Kravetz, O. A. Lytvynenko, S. K. Panishko*: “**OBSERVATION THE POWER COSMIC RADIOSOURCES ON THE THE RADIOTELESCOPE URAN-4 DURING 1998 – 2004**”.

17.10-17.25.

8. *A. Volvach, M.I.Ryabov*: “**VARIABILITY EXTRAGALACTIC RADIOSOURCES ON THE MILLIMETER AND METER WAVELENGTHS**”.

17.25- 17.40

9. *O. A. Lytvynenko, V. G. Derevyagin, V.B. Koshukhar*: “**USE OF THE RADIO TELESCOPE URAN-4 FOR SOUNDING OF AN IONOSPHERE AND MAGNETOSPHERE**”.

20.00-22.00. WELCOME PARTY

Wednesday, August 17

MORNING LECTURES (3 lectures x 45 min)

Radioastronomy:

10.00-10.45. *A.A. Konovalenko* (Akademic NANU, Vice-president of Ukrainian Astronomical Association, RI NANU, Kharkov, Ukraine): “**PERSPECTIVES OF DEVELOPMENT RADIOASTRONOMY ON LOW FREQUENCIES**”.

Geodynamics:

10.50-11.30. *Prof. N.S. Sidorenkov* (Moscow, Russia): “**PHYSICS OF THE EARTH'S ROTATION INSTABILITIES**”.

11.35-12.00. COFFEE AND COLD WATER BREAK

Astrophysics:

12.00-12.45. *Prof. A.A. Minakov* (RI NANU, Kharkov, Ukraine): “**PECULIARITIES OF STATISTICAL ANALYSIS OF MICROLENSING EFFECTS IN RESTORING THE PARAMETERS OF QUASARS AND MASS DISTRIBUTION IN LENSING GALAXIES**”.

13:00-14:00. LUNCH

15.00-18.00. EXCURSION TOURS: BUS TOUR OF ODESSA CITY, GAMOW TOURS IN ODESSA, MARINE EXCURSION.

Thursday, August 18

MORNING LECTURES (3 lecture x 45 min)

Radioastronomy:

10.00-10.45. *Dr. G.M. Rudnitskij* (GAIH MGU, Moscow): “**RADIO SPECTROSCOPY STUDIES AT THE STERNBERG ASTRONOMICAL INSTITUTE**”.

Astrophysics:

10.50-11.35. *Dr. S. Moiseenko* (IKI RAN, Moscow): “**MAGNETOROTATIONAL INSTABILITY IN MAGNETOROTATIONAL SUPERNOVAE**”.

11.35-12.00. COFFEE AND COLD WATER BREAK

Radioastronomy:

12.00-12.45. *Prof. A.D. Kuzmin* (Pushchino Radio Astronomy Observatory, Russia): “**THE REVIEW REPORT “GIANT PULSES OF PULSARS RADIO EMISSION”**”.

13:00-14:00. LUNCH

AFTERNOON SESSIONS

Astrophysics:

15.00-18.00. (15 min – 13 reports)

15.00-15.15.

1. *V. Vakulik*: “OBSERVATIONAL DETERMINATION OF THE TIME DELAYS IN GRAVITATIONAL LENS SYSTEM Q2237+0305”.

15.15-15.30.

2. *E. Karitskaya*: “THE HIGH-RESOLUTION OPTICAL SPECTROSCOPY AS A METHOD OF X-RAY BINARY CYG X-1”.

15.30-15.45.

3. *E. Panko*: “COMPARISON OF POSITIONS OF GALAXY CLUSTERS TAKEN FROM OUR NEW GALAXY CLUSTER CATALOGUE AND ABELL GALAXY CLUSTERS CATALOGUE”.

15.45-16.00.

4. *G. Anisimova*: “THE FLUCTUATIONS IN THE STELLAR AND IRAS DISTRIBUTION”

16.00-16.20. COFFEE AND COLD WATER BREAK

16.20-16.35.

5. *A. Miroshnichenko*: “JET VELOCITIES IN QUASARS AND GALAXIES”.

16.35-16.50.

6. *E. Koptelova*: “STRUCTURE OF QUASARS VIA MICROLENSING”.

16.50-17.05.

7. *O.Yu. Tsupko, G.S. Bisnovatyi-Kogan*: “APPROXIMATE DYNAMICS OF NON-COLLISIONAL ELLIPSOIDS”.

17.05-17.20.

8. *N. Kostogryz*: “THE DETERMINATION OF SINGLE SCATTERING ALBEDO IN THE NON-ISOTHERMAL NEPTUNE ATMOSPHERE WITH TAKING INTO ACCOUNT RAMAN SCATTERING”.

17.20-17.35.

9. *F. Sirotkin*: “THE MASS EXCHANGE IN CLOSE BINARY SYSTEMS CONSISTING OF THE LOW MASS PRE-MAIN SEQUENCE STARS”.

17.35-17.50.

10. *T. Shumakova*: “CHEMICAL GRADIENT EVOLUTION IN MASSIVE GALAXY DISK DUE TO ITS MINOR MERGER WITH DWARF GALAXY”.

17.50-18.05.

11. *V.V. Schliahovoi, V.P. Schliahovoi, N.M. Zalivadnyi*: “RESEARCH OF GRAVITATIONAL WAVES ACCORDING TO ASTRO-OPTICAL AND GEOPHYSICAL OBSERVATIONS”.

18.05-18.20.

12. *D. Khokhlov*: “EFFECTIVE GRAVITY: ANOMALOUS PHENOMENA IN THE SOLAR SYSTEM”.

18.20-18.30.

13. *F. Shumakov*: “ABOUT GEODYNAMIC A TOTAL ENERGY”.

18.30-19.00. SUPPER

AFTERSUPPER SESSIONS

19.00- 21.00.

Radioastronomy:

“TECHNICAL SUPPORT AND PERSPECTIVES OF RESEARCHES ON RADIO TELESCOPES OF A SYSTEM URAN”.

19.00-19.15. *R.O. Kravetz, I.O. Lytvynenko*: “VERSATILE CHANNELS OF SIGNAL CONVERSION AND RECORDINGS FOR RADIO TELESCOPES OF URAN SYSTEM”.

19.15-19.30. *I.O. Lytvynenko*: “TWO-BIT REPRESENTATION OF NONSTATIONARY GAUSSIAN NOISE FOR MEASUREMENT OF RADIO BURSTS CHARACTERISTICS”.

19.30-21.00. “DISCUSSION ABOUT PERSPECTIVES OF SCIENTIFIC RESEARCHES”.

Friday, August 19

MORNING LECTURES (4 lecture x 40 min)

Cosmology:

10.00-10.40. *Prof. V.P. Oleinik* (National Technical University of Ukraine, Kiev): “LIGHT BARRIER, THE SUPERLUMINAL INFORMATION, AND STABILITY OF THE UNIVERSE”.

Geodynamics:

10.45-11.25. *Dr. O.A. Lytvynenko* (Odessa observatory RI NANU): “RADIOASTRONOMY OF THE DECAMETER WAVES AND GEOPHYSICS. POINT OF CONTACT”.

11.25-11.40. COFFEE AND COLD WATER BREAK

Astrophysics:

11.40-12.20. *Prof. S.M. Andrievskiy* (Department of astronomy ONU): “CHEMICAL AND DYNAMIC EVOLUTION OF GALAXY”.

Geodynamics and Astrobiology:

12.20-13.00. *Dr. M.I. Ryabov* (Odessa observatory RI NANU): “SPACE WEATHER” AND ITS EFFECTS IN ATMOSPHERE AND BIOSPHERE”.

13:00-14:00. LUNCH

AFTERNOON SESSIONS

Cosmology:

15.00-18.00. (15 min – 9 reports)

15.00-15.15.

1. *L.V. Grunskaya, V.A. Efimov*: “GRAVITATION EFFECTS AND ELECTROMAGNETISM OF THE LOWER LAYER SURFACE.”

15.15-15.30.

2. *V. Olyeynik, Yu. Zubkov*: "ON THE STABILITY CONDITIONS AND ON THE GROWTH CONDITIONS OF THE QUASI-CLOSED UNIVERSE".

15.30-15.45.

3. *S. Grinyok*: "ELECTRICALLY CHARGED AND NEUTRAL WORMHOLE INSTABILITY IN SCALAR-TENSOR GRAVITY".

15.45-16.00.

4. *I. Nurgaliev*: "DYNAMICS OF PERTURBATIONS IN MULTICOMPONENTIAL EXPANDING COSMOLOGIC MEDIUM AND STRUCTURE OF THE UNIVERSE".

16.00-16.20. COFFEE AND COLD WATER BREAK

16.20-16.35.

5. *O. Potashko*: "PLANETARY CYCLES OF LIFE".

16.35-16.50.

6. *Y. Semenov*: "THE BLACKETT EFFECT AS A SPONTANEOUSLY BROKEN SYMMETRY".

16.50-17.05.

7. *Yu. Muntyan, V. Olyeynik*: "THE MODEL OF MINI-UNIVERSE WITH NEUTRINO FIELDS".

17.05-17.20.

8. *V. Olyeynik, H. Shapovalov*: "COSMOLOGICAL ELECTROMAGNETIC FIELD: ON THE MODELS OF MULTICONNECTED UNIVERSE".

17.20- 17.35.

9. *V. Olyeynik, Yu. Zubkov*: "ON THE STABILITY CONDITIONS AND ON THE GROWTH CONDITIONS OF THE QUASI-CLOSED UNIVERSE".

20.00-24.00. BANQUET

Saturday, August 20

THE DAY OF DEPARTURE

ABSTRACTS

The fifth Gamow's Odessa Astronomical Summer School: "ASTRONOMY AND BEYOND: ASTROPHYSICS, RADIOASTRONOMY, COSMOLOGY AND ASTROBIOLOGY"

LECTURES

SOLAR SPORADIC RADIO EMISSION AT THE DECAMETRIC WAVES

¹*V.N. Melnik, ¹A.A. Konovalenko, ²H.O. Rucker,
¹E.P. Abranin, ¹V.V. Dorovskyy, ³A. Lecacheux,
¹A.A. Stanislavsky*

¹*Institute of Radio Astronomy, Nat.Acad.Sci.Ukraine,
²Space Research Institute, Austran Acad. Sci., ³Observatory of Paris-Meudon, France*

The results of observations of Solar sporadic radio emission on the UTR-2 radio telescope in 2001-2004 are introduced in the presentation. Using of new back-end facilities – the DSP and 60-channel spectrometer allows obtaining data with time resolution up to 2 ms and frequency resolution 12 kHz in the continuous frequency band 12MHz. Usual Type III bursts, type III-b bursts, U- and J- bursts, spikes as well as unusual bursts at the decameter wavelength band are discussed in the presentation. Especial attention is paid to detection and analysis of Type II bursts and their properties, fine structure of Type III bursts, new observational features of Drift pair bursts, "absorption" burst and statistical analysis of solar radio bursts.

MODERN THEORY OF THE EARTH'S NUTATION

*Ya.S. Yatskiv
MAO NANU*

ETYMOLOGY OF BLACKHOLE

*A.M.Cherepashchuk
GAIH, MGU*

PERSPECTIVES OF DEVELOPMENT RADIOASTRONOMY ON LOW FREQUENCIES

*A.A. Konovalenko
Institute Radioastronomy NANU*

PHYSICS OF THE EARTH'S ROTATION INSTABILITIES

*N.S. Sidorenkov
Rosgidromet, Moscow*

The presentation generalizes the results of research in the instabilities of the Earth rotation and related geophysical processes. The focus of the study is centered on the nature of these processes.

Long series of observations of the Earth orientation parameters are demonstrated. The tidal variations in the length of day are described. The temporal variations of the atmospheric angular momentum and their contribution in the instabilities of the Earth rotation are studied. The mechanism of seasonal variations in the length of day is discussed. The interannual oscillations of the Earth-ocean-atmosphere system are described and the model of excitation of the Chandler polar motion is formed. The mechanical action of atmosphere on the Earth rotation is reviewed. The mechanism of the short-time continental drift is offered. The probable geophysical processes, responsible for decade (2-100 years) instability of the Earth rotation are discussed.

PECULIARITIES OF STATISTICAL ANALYSIS OF MICROLENSING EFFECTS IN RESTORING THE PARAMETERS OF QUASARS AND MASS DISTRIBUTION IN LENSING GALAXIES

*¹A.A.Minakov, ²V.G.Vakulik
¹Institute of Radio Astronomy of Nat.Ac.Sci. of
Ukraine, Kharkov*

*²Institute of Astronomy of Karasin National
University, Kharkov*

Determination of the Hubble constant H_0 and restoration of parameters of mass distribution in lensing galaxies are presently the basic astrophysical applications of gravitational lens (GL) phenomenon. Many years of observations of GL candidates have shown that the light curves of the sources observed through the GL are often subjected to the effects of microlensing (ML). This is especially true for images of the sources observed through the GL regions with the high stellar density. On one hand, the effects of ML

complicate determination of time delays of signals arriving from different images, which is necessary for determining, and on the other hand, they contain a valuable information about the spatial and temporal structure of quasar sources, and about the mass distribution and mass motions in lensing galaxies. The analysis of ML effects makes it possible to associate statistical characteristics of the observed light curves of images with the parameters of sources and lensing galaxies. Unfortunately, peculiarities of the Newtonian potential (long-range action) result in the fact that not only the stars neighboring to the line of sight contribute to the light curves observed, but also the distant stars do. To correctly evaluate the number of stars that should be taken into account, a statistical analysis of the totality of microlens-stars populating the macrolens-galaxy is needed.

A detailed theoretic and numerical analysis of the effects of microlensing in a globular cluster obeying the King distribution was carried out in the work. The analysis allowed to obtain a number of numerical estimates and to make some conclusions.

RADIO SPECTROSCOPY STUDIES AT THE STERNBERG ASTRONOMICAL INSTITUTE

G. Rudnitskij

Sternberg Astronomical Institute, Moscow

The studies on spectroscopy of the interstellar medium and circumstellar envelopes in molecular radio lines, carried out by the Radio Astronomy Department of the Sternberg Astronomical Institute, are reviewed. Since 1980 a regular monitoring of cosmic maser sources in the 22 GHz rotational line of water vapour molecule has been performed on the RT-22 radio telescope of the Pushchino Radio Astronomy Observatory. The programme includes 125 maser sources (star-forming regions and late-type stars).

Regularities found in the time behavior of cosmic masers are discussed. In addition, a search of narrow-band (presumably SETI) signals from nearby solar-type stars (selected by schoolchildren-amateur astronomers) has been carried out at the frequencies of 22 GHz (H₂O line) and 36 GHz (HC₃N line). No signals with a flux density exceeding 10 Janskys have been found.

MAGNETOROTATIONAL INSTABILITY IN MAGNETOROTATIONAL SUPERNOVAE

S. Moiseenko

IKI RAN, Moscow

We discuss the results of 2D simulations of magnetorotational supernova mechanism. It was shown that during the evolution of the magnetic field the magnetorotational instability (MRI) appears. MRI leads to the significant decreasing of the supernova explosion time. The simulations were made for the different initial magnetic field configurations. The dependence of the shape of the supernova explosion from the symmetry type of the initial magnetic field is discussed.

THE REVIEW REPORT "GIANT PULSES OF PULSARS RADIO EMISSION"

A.D. Kuzmin

Pushchino Radio Astronomy Observatory

Giant pulses, neutron stars, a special form of pulsar radio emission, are short-duration outbursts of pulsars radio emission, a rare phenomenon observed only in ten pulsars among more than 1500 known ones.

We present the review report of this phenomenon, based on our detection of three new pulsars with giant pulses PSR B0031-07, PSR B1112+50 and J1752+2359 and the comparative analysis of the previously known giant pulses: the Crab pulsar PSR 0531+21, millisecond pulsars PSR J0218+4322, B1821-24, J1823-3021, B1937+21 and B1957+20 and extragalactic pulsar PSR B0540-69 in Large Magellanic Cloud.

Giant pulses are distinctive in very large fluxes and energy of pulsar radio emission, very short pulse duration and extremely compact emitting body. Giant pulses are the brightness sources of radio emission among the known astronomical objects.

One notes a special features of pulsars with giant pulses, which suggests an existence of different classes of these objects.

Giant pulses provided a new capabilities for pulsar's study, including a search and study of extragalactic pulsars.

LIGHT BARRIER, THE SUPERLUMINAL INFORMATION, AND STABILITY OF THE UNIVERSE

V. Oleinik

National Technical University of Ukraine, Kiev

It is shown that the own field of electrically charged particle to be capable of instantaneously transmitting a signal (information) about any changes occurring with this particle to arbitrarily great distances. This conclusion rigorously follows from Maxwell's equations for electromagnetic field. Physical mechanism of appearance of superluminal signals is due to the non-local connection between potentials and intensities of electric and electromagnetic fields. In quantum systems superluminal signals occur at every step, in any quantum process. The results obtained do not contradict special relativity, and are of great importance for any cosmological model investigation.

RADIOASTRONOMY OF THE DECAMETER WAVES AND GEOPHYSICS. POINT OF CONTACT

O.A. Lytvynenko

Odessa observatory RI NANU

CHEMICAL AND DYNAMIC EVOLUTION OF GALAXY

S.M. Andrievskiy

Department of astronomy ONU

"SPACE WEATHER" AND EFFECTS OF ITS INFLUENCE ON THE EARTH ATMOSPHERE AND BIOSPHERE

M.I. Ryabov

Odessa observatory RI NANU

RADIOASTRONOMY

PRESENT STATE AND FUTURE OF THE INTERFEROMETER NETWORK URAN. NEW EQUIPMENT AND METHODS

V. Shepelev

IRA NAS Ukraine

RADIOPOLARIMETER URAN-2, PRELIMINARY RESULTS OF THE SUN OBSERVATIONS

¹A.I. Brazhenko, ²E.P. Abranin, ¹A.V. Frantsuzenko, ²A.A. Konovalenko, ³A. Lecacheux, ²V.N. Mel'nik, ⁴H. Rucker, ¹R.V. Vashchishin

¹Poltava gravimetric observatory, Poltava,

²Institute of Radio Astronomy, Kharkov,

³CNRS & Observatory de Paris, France,

⁴Institute of Space Researches, Austria

The description and characteristics of the tool is given. The technique of polarizing measurements with aerials URAN is discussed. Preliminary observation results of polarizing characteristics of decametric solar radio emission of various types are submitted.

"THE FORMULA FOR RELATIVISTIC JET ACTIVITY OF QUASARS AND RADIO GALAXIES"

P.I. Fomin, A.P. Fomina

FLUCTUATIONS OF A CIRCULAR POLARIZATION DEGREE OF RADIATION FROM RADIOSOURCES

¹R.V. Vashchishin, ²E.P. Abranin, ¹A.I. Brazhenko, ²I.S. Falkovich, ¹A.V. Frantsuzenko, ²A.A. Konovalenko, ³A. Lecacheux, ⁴H. Rucker, ²O.M. Ulyanov, ²V.V. Zakharenko

¹Poltava gravimetric observatory, Poltava,

²Institute of Radio Astronomy, Kharkov,

³CNRS & Observatory de Paris, France,

⁴Institute of Space Researches, Austria

Results of observations of Cas A and Cyg A with the radiopolarimeter URAN-2 are submitted. Significant fluctuations of a circular polarization degree of powerful sources radioemission in decametric waves are found out.

SIMULTANEOUS OBSERVATIONS OF SIX PULSARS AT FREQUENCIES 23.7 MHz & 34.5 MHz USING UTR-2 AND GEETEE RADIO TELESCOPES

¹O. Ulyanov, ¹V. Zakharenko, ^{2,3}A. Deshpande, ²A. Asgekar

¹Institute of Radio Astronomy NASU (Kharkov, Ukraine);

²Raman Research Institute (Bangalore, India);

³National Astronomy and Ionosphere Center (Arecibo, USA)

We have carried out simultaneous and quasi-simultaneous observation of six pulsars at frequencies 23.7 MHz & 34.5 MHz using UTR-2 (Ukrainian) GEETEE (Indian) radio telescopes in December 2001.

We succeeded in recording peak pulses for PSRs: B0809+74, B0823+26, B0834+06, B0943+10, B0950+08, B1133+16, power of which 50-100 times greater than power of average pulses of these pulsars. We have shown that all properties of these single pulses correspond to properties of Giant pulses, which were found for several pulsars at higher frequencies [1,2,3]. We have shown that processes of amplification of individual impulses in magnetosphere of pulsars also take place in a decameter waves.

The probability of registration of individual pulses in decameter range is relatively low. In this work we have got a spectral flux density for such pulses and evaluated their brightness temperature. We have also evaluated the time constants of scattering for single pulses directly from the observations.

Peculiarities of the process of generation single pulses on such low frequencies are defined in the present work.

Bibliography:

R.W. Romani and S. Johnston, *Astrophys. J.* 557, 93 2001.
S. Johnston and R.W. Romani, *Monthly Notices Roy. Astron. Soc.* 332, 109, 2002.
A.A. Ершов, А.Д. Кузьмин, Письма в «Астрон. журн.» 29, 91, 2003.

CONVERTING THE MODULATION CHANNEL OF SYSTEM URAN RADIO TELESCOPES TO A COMPLEX CORRELATION RADIOMETER

¹A.B. Lozynskyy, ²V.V. Koshovyy

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Modulation channel is the significant unit of system URAN radio telescopes and it represents radiometer operating on the principle of phase modulation. It is necessary for autonomous observations and for inspecting, adjusting and repair works. Usage of modulation principle considerably confines an amount and quality of the information obtained during observations. The complex correlation radiometer has a higher sensitivity as well as allows separate registration of amplitude and phase of complex visibility function and is free from principal deficiencies, typical for modulation radiometer. However, its realization in the system URAN radio telescopes is complicated because it requires doubling the amount of receivers in radiometric channel. It is proposed in the paper, the way to convert radiometer, avoiding complication of the present receiving tracts accordingly to the complex correlator schema. For this purpose the instrumentation of both modulation and interferential channels of the radio telescope is used, moreover interferential channel is operating in standard mode. It should be mentioned that such converting of a radiometer, even if applied to only one of the stations of a VLBI system URAN, does not influence on system components interaction, as the changes to radio telescope do not affect its interferential channel in any way.

OBSERVATION THE POWER COSMIC RADIO SOURCES ON THE RADIOTELESCOPE URAN-4 DURING 1998 – 2004

V. G. Derevyagin, E. A. Isaeva, R. O. Kravetz,
O. A. Lytvynenko, S. K. Panishko
Odessa observatory URAN-4 IRA NANU

VARIABILITY EXTRAGALACTIC RADIO SOURCES ON THE MILLIMETER AND METER WAVELENGTHS

¹A. Volvach, ²M. Ryabov
¹Radio Astronomy Laboratory of CrAO, Ukraine
²Odessa observatory "URAN-4" RINANU

USE OF THE RADIO TELESCOPE URAN-4 FOR SOUND- ING OF AN IONOSPHERE AND MAGNETOSPHERE

O. A. Lytvynenko, V. G. Derevyagin, V. B. Koshukhar
Odessa observatory URAN-4 IRA NANU

VERSATILE CHANNELS OF SIGNAL CONVERSION AND RECORDINGS FOR RADIO TELESCOPES OF URAN SYSTEM

R. O. Kravetz, I. O. Lytvynenko
Odessa observatory URAN-4 IRA NANU

TWO-BIT REPRESENTATION OF NONSTATIONARY GAUSSIAN NOISE FOR MEASUREMENT OF RADIO BURSTS CHARACTERISTICS

I. O. Lytvynenko
IRA NANU

ASTROPHYSICS

OBSERVATIONAL DETERMINATION OF THE TIME DELAYS IN GRAVITATIONAL LENS SYSTEM Q2237+0305

¹V. G. Vakulik, ²R. E. Schild, ¹V. N. Dudinov,
³S. N. Nuritdinov, ⁴V. S. Tsvetkova, ³O. A. Burkhonov,
³T. A. Akhunov
¹Institute of Astronomy of Kharkov National University,
Ukraine,
²Center for Astrophysics, U.S.A.,
³Ulugh Beg Astronomical Institute of Ac.Sci. of
Uzbekistan,
⁴Institute of Radio Astronomy of Nat.Ac.Sci. of Ukraine

We present new brightness monitoring observations of the 4 components of gravitationally lensed system Q2237+0305, which show detection of an intrinsic quasar brightness fluctuation at a time of subdued microlensing activity, between June 27 and October 12, 2003. These data were used to determine the time delays between the arrivals

of the four images. The measured delays are $\tau_{(BA)} \approx 6$, $\tau_{(CA)} \approx 35$, and $\tau_{(DA)} \approx 1.8$ hours, so they confirm that the long history of brightness monitoring has produced significant detection of microlensing. However the error bars associated with the delays, of order 2 days, are too large to discriminate between competing macro-imaging models. Moreover, our simulations show that for the amplitude of this intrinsic fluctuation and for photometric errors intrinsic to optical monitoring from our 1.5-m telescope or from the OGLE monitoring, a daily sampled brightness record cannot produce reliable lags for model discrimination. We use our simulations to devise a strategy for future delay determination with optical data. Nevertheless, we regard these first estimates to be significant, since they are the first direct measurements of time delays made for this system from ground-based observations in the visual wavelengths. Our results provide the most convincing confirmation of the gravitational-lens nature of Q2237+0305, and give observational justification to the extensive literature which attributes the quasar's previously observed brightness fluctuations to microlensing.

THE HIGH-RESOLUTION OPTICAL SPECTROSCOPY AS A METHOD OF X-RAY BINARY CYG X-1 INVESTIGATION. THE RESULTS OF CYG X-1 MONITORING DURING 2002-2004

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The detailed spectral analysis is recognized as necessity to understand the physical nature of different phenomena in Cyg X-1. We discuss the possibilities by the high-resolution spectroscopy to understand the way of gas flow between the components, the physical characteristics of gas outflow from supergiant and in the regions of accretion struc-

ture, the origin of 147 day period, a significant correlation between the long-time optical and 2-10 keV X-ray variations (with the lagging of the last ones), and some other features of the system.

The results of observations carried out by the use of the echelle spectrometers of the 2-m telescope (Peak Terskol Observatory, 3100 m) and of 1.84-m telescope (BOAO, South Korea) are given. The obtained high-precision spectra ($R=45000, 30000, 13000$ and 100000) cover the whole or the main part of optical spectral range at the same time. The spectra were obtained during the "soft" and "hard" states of Cyg-X-1. The different types of profile dependencies for some spectral lines from X-ray 2-12 keV flux value were researched by comparing this spectral material with X-ray RXTE/ASM data. X-ray flare of 13.06.2003 led to strong line profile variations in H α and HeII λ 4686Å emissions during several hours. This behavior we connect with variations of ionization structure of matter in the system Cyg X-1. The comparison of observed and non-LTE model calculated profiles for HeI and MgII go to $\log g = 3.34$ instead of 3.18 for Herrero et al (1995) and for overabundance of He and Mg: $[He/H] = 0.43$, $[Mg/H] = 0.59$.

The sequence of line profile variation with the orbital phases is clearly observed. The Doppler image was reconstructed by using the improved method of Doppler tomography on the base of HeII λ 4686Å profiles. The tomograms show optical component to be 3-4 times more massive than X-ray one.

COMPARISON OF POSITIONS OF GALAXY CLUSTERS TAKEN FROM OUR NEW GALAXY CLUSTER CATALOGUE AND ABELL GALAXY CLUSTERS CATALOGUE

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New Catalogue of Galaxy Clusters is constructed on the basis of the Muenster Red Sky Survey. In the catalogue we incorporate structures containing at least 7 galaxies each. Structure containing 30 or more member objects is considered as cluster. We compare the positions on the celestial sphere clusters from our New Catalogue with ACO clusters. We found good correlation among rich objects.

THE FLUCTUATIONS IN THE STELLAR AND IRAS DISTRIBUTION

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The rules are formulated for the localization of the density fluctuations of the field stars, which are not the consequence of the light absorption. The rules are connected with the discrete, regular sky net. The positive deflections from the mean density at the given galactic latitude are concentrating to the net meridians between its poles and knots. The negative ones are in the regions of these points and between the meridians. This rule can be verified over the catalogues, complete to some stellar magnitude. For ex-

ample, over SAO catalogue, complete to $V=9m$, over the counts in the cells (DI, Db)=(3°,3°), by Anisimova. The consent is illustrated for the regions of 30° around the poles and 4 main ecliptic points. The belts of bunches of net meridians pass here, including the Milky Way, Zodiacal belt, Gould Belt and so on. All prognoses are confirmed. The density contrast is 1.5 - 2 and more times. These fluctuations can not be classified as accidental, unlike the effects of second order - the detail contours, dimensions of fluctuations, etc.

Both the point IRAS sources at $\lambda=12, 25, 60$ and 100 μ m, and the open stellar clusters in these regions repeat the peculiarities in stellar distributions.

JET VELOCITIES IN QUASARS AND GALAXIES

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On the basis of observed data at high radio frequencies and optics for quasars and galaxies we estimate jet propagation velocities by several methods. These velocities values are sublight for objects in our sample. We consider the relation between the jet propagation velocity and cosmological epoch.

STRUCTURE OF QUASARS VIA MICROLENSING

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Observations of the high magnification events in the A and C components of the quadruple gravitational lens QSO2237+0305 observed by OGLE and GLITP collaborations in V band allows reconstruction quasar accretion disk profile. For the reconstruction of the one-dimensional source profile the technique based on Tikhonov regularization method is used. The estimates of the effective radius of the quasar emitting region (the radius within which half of the light is emitted) based on reconstructed profile of the source from microlensing of the A and C components are in the range of 31 and 21 days and correspond to the linear sizes $0.62e+15$ cm and $0.42e+15$ cm. For the A component the positive crossing of the caustic and for the C component the negative crossing of the caustic is confirmed.

APPROXIMATE DYNAMICS OF NON-COLLISIONAL ELLIPSOIDS

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Collapse of a non-collisional dark matter and formation of pancake structures in the universe are investigated approximately. The collapse is described by a system of ordinary differential equations, in the model of a uniformly rotating, 3-axis, uniform density ellipsoid. Violent relaxation,

mass, and angular momentum losses are taken into account phenomenologically. The formation of the equilibrium configuration, secular instability and transition from a spheroid to 3-axis ellipsoid are investigated numerically and analytically in this dynamical model.

THE DETERMINATION OF SINGLE SCATTERING ALBEDO IN THE NON-ISOTHERMAL NEPTUNE ATMOSPHERE WITH TAKING INTO ACCOUNT RAMAN SCATTERING

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Raman scattering is light interaction with matter which is accompanied by changing of scattering radiation frequency. This scattering is incoherent, in other words scattering radiation frequency have another value than incident radiation.

We can observe the Raman spectra even in those molecules which haven't a infrared spectrum and the best example of this molecule is hydrogen.

So we can observe the details of Raman scattering in the in the giant planet Ultra Violet (UV) spectrum as atmosphere of this objects consists of nearly 85% of hydrogen molecules. Since its condition is scattering on the hydrogen molecules that, it is obviously, the intensity of Raman scattering details are lesser when the relative hydrogen concentration is lesser and when the role of aerosol constituent of atmosphere is increased.

Raman scattering in the isothermic giant planet atmospheres were considered by Morozhenko (1997). But the planetary atmospheres are gas-aerosol medium, and the optical parameters are changing with altitude.

As the atmosphere's spectrum is forming on the different heights so the contribution of Raman Scattering into the observing spectrum will be different for each spectral intervals.

So, we were computed the influence of non-isothermic atmosphere to intensity of Raman Scattering details in the Neptune atmosphere. There were shown that the intensity of Raman scattering would depend on the depth of its forming level in the optical homogeneous non-isothermic atmosphere and that the mistakes will be large when we don't take into account real temperature profile in the upper levels of atmosphere.

THE MASS EXCHANGE IN CLOSE BINARY SYSTEMS CONSISTING OF THE LOW MASS PRE-MAIN SEQUENCE STARS

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In this paper, we present the results of smoothed particle hydrodynamic (SPH) simulations of mass transfer in close binary systems consisting of the low mass pre-main sequence stars. Two scenarios of mass exchange in such systems are possible. If the more massive component is closer to fill its Roche lobe than the less massive, then the binary system merges as a result of the mass exchange. The binary system can survive only in the case if the less massive component is closer to fill its Roche lobe to the beginning of a mass exchange.

CHEMICAL GRADIENT EVOLUTION IN MASSIVE GALAXY DISK DUE TO ITS MINOR MERGER WITH DWARF GALAXY

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Main goal of this work is the investigations of chemical gradient changes in massive galactic disk owing to its interaction (encountering) with low mass satellite with lowered heavy elements abundance. For this problem consideration a special computer program of galaxies encounters dynamical modelling by N-body method was developed. This N-body algorithm realization also includes the processes of viscosity particle collisions. Disk galaxy and its dwarf satellite at the initial time moment are described as balanced configurations of Plummer-Kuzmin and Plummer particle distributions respectively. We also include in N-body dynamical model the conception of heavy elements abundance in particles Z . In such form the particles (bodies) describe the whole gravitationally combined regions of gas and stars mixture. As a first approximation we do not consider the star formation processes and related to them the heavy elements enrichment of individual modelled particles. We also neglect possible mass exchange (and chemical elements exchange) between particles. We determine the chemical gradient of heavy elements abundance in galaxy disk after the collision over the set of dynamical particle mixture from both disk (bulge) particles and dwarf satellite particles. In comparison with isolated dynamical disk galaxy evolution process, in the case of its encounter with dwarf galaxy the gradient of chemical heavy elements abundance in galactic disk feels strong changes (decreases). In the process of dwarf and disk galaxies encounter in our model we observe a distinct lowering of chemical heavy elements abundance in the disk at the place of dwarf galaxy position.

With our modeled parameters this lowering diffuses during about 6 billions of years after the encounter. We have compared the received results with the observational data for disk galaxy NGC 2903. As in this galaxy the compact area with lowered heavy elements abundance still is distinct observed we can conclude that the dwarf galaxy absorption at this object has happened less than 6 billions years ago.

RESEARCH OF GRAVITATIONAL WAVES ACCORDING TO ASTRO-OPTICAL AND GEOPHYSICAL OBSERVATIONS

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Investigation of gravitational waves (GW) in the atmosphere is a very actual problem. GW exert influence on the various processes occurring in the atmosphere and tectonics of the earth's crust. It is believed that these waves cause weather anomalies and fluctuations of atmospheric fronts. They limit accuracy of measurements at researches of the earth's tide and free oscillation of the Earth, radio-astronomical, astrooptical and GPS measurements, etc. GW researches

are usually carried out by indirect methods as simple direct methods practically are not present. For an estimation of parameters GW we used the data of tidal observation and also results of definitions of parameters of rotation of the Earth on astrolabe in Poltava on the high-frequency region.

EFFECTIVE GRAVITY: ANOMALOUS PHENOMENA IN THE SOLAR SYSTEM

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It is considered the effective gravity which includes the Newtonian potential and the fixed potential. It is investigated the effective gravity in the solar system. Footprints of the fixed potential of the sun may be revealed as an anomalous shift of the perihelion of the Keplerian orbit of a planet or as an anomalous shift of the frequency of the electromagnetic field or as a polarization of the planet's satellite orbit. The fixed potential of the sun allows to explain three anomalous phenomena, the anomalous shift of the perihelion of mercury, the anomalous acceleration of Pioneer 10, 11, the anomalous increase in the lunar semi-major axis.

ABOUT GEODYNAMIC A TOTAL ENERGY

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From substantive provisions of Special and General Relativity, to symmetry of physical laws and Principle Equivalence it is exhibited, that at transport of a body from perpetuity on an earth surface to happen the magnification a total energy of a body on quantity equal to product of mass on value of gravitational potential. The field of gravity reflects character of a mass distribution in subsoil of planets, and also depends on the form of surface of planets and from geodynamical processes. The gravitational field in any point of the Earth has stationary values time changes. It gives in stationary values to changes a total energy of substance of a lithosphere, an atmosphere and an ionosphere. The study of geodynamic properties a total energy of a body and an electromagnetic behaviors of a surrounding medium in a variable gravitational field, promotes more to the severe fathoming of diversiform processes happening in a gravitational = field of the Earth, the Sun and other planets and stars and development of new energy technologies.

COSMOLOGY

GRAVITATION EFFECTS AND ELECTROMAGNETISM OF THE LOWER LAYER SURFACE

L. V. Grunskaya, V. A. Efimov

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While solving the main problem of the project related to the investigation of the interaction of the ELF electromagnetic field in the Earth – ionosphere cavity with the gravitational fields of geophysical and astrophysical origin, a number of important results was received. The experimental and theoretical investigations of the scientist groups of

Vladimir State University, IZMIRAN, KSU, MGO SIC DMA, GAISh MGU have been combined with the object of complex investigating of the physical nature and typical features of the interconnection between the electromagnetic and gravitational fields in nature. There has been provided the mode of separated in space synchronous monitoring of the ELF electromagnetic fields on the set of stations (VSU physical proving ground and its station on the building, MYO SIC DMA station, YAISh MGU) allowing to use the advantages of the separated in space receiving of the electromagnetic fields while extracting the influence of the moon and solar tides and the gravitational – wave sources. There was simulated theoretically the electrical processes in the atmosphere surface lower layer. There has been constructed and investigated a model of non – local response of the electrically polarized medium to the plane gravitational wave effect, on the basis of the covariant enunciation of the integral material equation. The problem of the anomalous behavior of the electrodynamic system response to the gravitational – wave affect is being discussed. It was managed to estimate for the first time the amplitudes and phases on the frequencies of the moon – solar tides with the help of the radiotechnical method of the experimental data optimal processing according to the monitoring of the atmosphere surface lower layer electrical field on the set of the separated in space stations for the period from 1997 till 2004. The work is carried out with supporting of grants RFBR N 04-05-64895, Program STP '209.06.01.035.

ON THE STABILITY CONDITIONS AND ON THE GROWTH CONDITIONS OF THE QUASI-CLOSED UNIVERSE

V. Olyeynik, Yu. Zubkov

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We study the stability conditions as well as the conditions for the growth of the axial string-like perturbations for the particle-like model, which internal part looks like quasi-closed universe.

ELECTRICALLY CHARGED AND NEUTRAL WORM-HOLE INSTABILITY IN SCALAR-TENSOR GRAVITY

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We study the stability of static, spherically symmetric, traversable wormholes with or without an electric charge, existing due to conformal continuations in a class of scalar-tensor theories with zero scalar field potential (so that Penney's or Fisher's well-known solutions hold in the Einstein conformal frame). Specific examples of such wormholes are those with nonminimally (e.g., conformally) coupled scalar fields. All boundary conditions for scalar and metric perturbations are taken into account. All such wormholes with zero or small electric charge are shown to be unstable under spherically symmetric perturbations. The instability is proved analytically with the aid of the theory of self-adjoint operators in Hilbert space and is confirmed by numerical computations.

**DYNAMICS OF PERTURBATIONS IN
MULTICOMPONENTIAL EXPANDING COSMOLOGIC
MEDIUM AND STRUCTURE OF THE UNIVERSE**

I. Nurgaliev

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The gravitational instability is considered in the Newtonian approximation in the multi-component expanding medium in the classic universe. It is shown that dynamics of the small perturbations can be expressed as an analytic solution composed of G-functions of Meijer in the number of cosmologically consistent (realistic) situations. One of the components becomes the fastest growing one and others stay negligible. Luminous matter demonstrates falling into the clusters of the mean component.

**GRAVITATION AND INERTIA BEFORE AND AFTER
EINSTEIN**

Besides common assumption about dark matter the hypothesis of the new type interactions is discussed such as gravi-magnetic interaction, gravi-inertion interaction dominating throughout the cosmological scales considered in the framework of some of the alternative theories. One of the alternative theories apply the very same approach which brought Maxwell from the Newton law to his equations and derives a system of gravitation and inertia equations from Newton formula of gravitation to dynamic theory of gravity and inertia.

PLANETARY CYCLES OF LIFE

*O. Potashko
NIP "Fractal"*

The destiny of life on heavenly body depends upon volcanic activity. When volcanic activity is on the decrease on a planet - the life is on the decrease too. Volcanic activity blows life into a planet - from one side. From other side volcanic activity is a destroying force of biolife. Volcanic ashes in atmosphere during volcanic activity may close the Sun for months and years. As a result the planet temperature drops down sharply – scenario of the «nuclear winter», i.e. the biblical Flood. When the clouds will disappear intensity of life will grow -quantities of populations as well as individuals - it will take place «nuclear summer». One may suppose this mechanism is responsible for the mass extinction 250 and 60 million years ago.

**THE BLACKETT EFFECT AS A SPONTANEOUSLY
BROKEN SYMMETRY**

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The Blackett effect is the generation of a magnetic field by an electrically neutral rotating mass was introduced by P.M.S. Blackett in 1947 as an alternative for the dynamo

hypothesis of the planetary magnetism. In this paper a new mechanism of the Blackett effect is proposed: a spontaneously broken symmetry of the Dirac-Maxwell vacuum state in the gravitational field of a rotating body. Such mechanism allow to explain geomagnetic reversals - the main difficulty of the effect.

The rotating body is approximated in presented calculations by a dielectric or conductive but electrically neutral massive rotating shell.

**THE MODEL OF MINI-UNIVERSE WITH NEUTRINO
FIELDS**

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Properties of the particle-like model with neutrino fields are investigated. This model is similar to Markov models for nearly closed universe.

**COSMOLOGICAL ELECTROMAGNETIC FIELD: ON
THE MODELS OF MULTICONNECTED UNIVERSE**

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We try to study properties of the four-dimensional space-time manifolds of $O(3)$ as well as of $SU(2)$ symmetry which are generalisations of the well known four-dimensional spherically symmetric Rimmannian space-time. In these space-times the self-gravitating electromagnetic field is of $O(3)$ or of $SU(2)$ symmetry.

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