Taras Shevchenko National University of Kyiv
Department of Astronomy and Space Physics

19th Young Scientists' Conference on Astronomy and Space Physics

Abstracts

Kyiv, 2012

19th Young Scientists' Conference on Astronomy and Space Physics

April 23-28, 2012
Kyiv, Ukraine

Scientific Organizing Committee

Vasyl M. Ivchenko (chair), Kyiv, Ukraine
Vasyl Ya. Choliy (co-chair), Kyiv, Ukraine
Gennadi P. Milinevsky, Kyiv, Ukraine
Bohdan I. Hnatyk, Kyiv, Ukraine
Nikolai N. Samus, Moscow, Russia
Klim I. Churyumov, Kyiv, Ukraine
Nataliya G. Shchukina, Kyiv, Ukraine
Ivan L. Andronov, Odessa, Ukraine
Peter P. Berczik, Kyiv, Ukraine
Yuri Shtanov, Kyiv, Ukraine

International Advisory Committee

Bogdan Wszolek, Czestochowa, Poland
Anatoliy M. Cherepashchuk, Moscow, Russia
Marcus Kirsch, Darmstadt, Germany

Local Organizing Committee

A. Koval (chair), G. Ivashchenko (secretary), Iu. Babyk, A. Simon, M. Sobolenko,
A. Klyueva, O. Vasylenko, D. Rogozin, K. Frantseva, K. Reznik, Ya. Shlyahetska,
V. Mogylchak, O. Torbaniuk, O. Ivanyuk, K. Agienko, S. Zaitsev, Ie. Vovk

Address for correspondence:

Dr. V. M. Ivchenko
P.O. Box 7
Kyiv-22, 03022, Ukraine

e-mail: ysc.kyiv@gmail.com

Address:

Astronomy and Space Physics Department,
Faculty of Physics,
Taras Shevchenko National University of Kyiv,
Glushkova ave., 4, Kyiv, 03127, Ukraine.
Phone: +(380) 44-526-44-57
Fax: +(380) 44-526-45-07

Preface

This year Young Scientists' Conference on Astronomy and Space Physics is held for the nineteenth time. We all have been looking forward to the annual meeting of astronomers at Taras Shevchenko National University of Kyiv. Now it has friendly opened its doors for participants from all over the world.

Young Scientists' Conference has a long history. The first meeting was organized by Physics faculty of the Taras Shevchenko National University of Kyiv as a students' conference in 1994. Since 1996 our conference has welcomed young researchers from other universities and scientific institutions. During 1994-2011 participants from Ukraine, Russia, Poland, France, Germany, Spain, Sweden, Libya, Egypt, Japan, Finland, Turkey, China, Slovakia, Armenia, USA, Romania and other countries participated in Young Scientists' Conference.

The conference is aimed at strengthen the position of astronomy and promote space physics research. The lectures and reports presented by the participants traditionally reflect modern trends and actual problems of the science, the sessions facilitate informational exchange about the latest innovations and achievements.

On behalf of the organizing committee we would like to express our gratitude to the invited lecturers and participants for contributing lectures and reports. We are especially grateful to Prof. V. M. Ivchenko for the help in conference organization.

Anatolii Koval and
Local Organizing Committee

PROGRAMME

Monday, April 23

09.00-12.00 - Registration
12.30-13.00 - Official opening

Section 'Exoplanets'

13.00-13.40 **Eduardo Martin** *(Centro de Astrobiologia, Torrejón de Ardoz, Spain) Planet formation in the context of galaxy and star formation* **(invited)**

13.40-14.20 **Michael Mishchenko** *(NASA Goddard Institute for Space Studies, New York, USA) Opposition optical phenomena in planetary astrophysics* **(invited)**

14.20-14.50 tea-break

14.50-15.05 Olga Zakhozhay *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) Circumsubstellar disks SED in dependence of system parameters* **(12+3)**

15.05-15.20 Kateryna Frantseva, N. M. Kostogryz, T. M. Yakobchuk *(Taras Shevchenko National University, Kyiv, Ukraine) Polarimetric effects simulation for HD 189733* **(12+3)**

15.20-15.35 Yana Shliakhetskaya, Yu. Kuznyetsova. *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Spectral studies of the transit system HD 189733* **(12+3)**

15.35-15.50 Artem Burdanov, V. V. Krushinsky *(Ural Federal University, Yekaterinburg, Russia) A technique for high-precision CCD photometry of transiting extrasolar planets with the MASTER-II-Ural telescope of the Kourovka astronomical observatory* **(12+3)**

15.50-16.05 Avril Day-Jones, F. Marocco, D. J. Pinfield et al. *(Universidad de Chile, Santiago, Chile) The sub-stellar birthrate from the UKIDSS survey* **(12+3)**

16.05-16.35 tea-break

Section 'Solar System'

16.35-16.50 Damian Puchalski, G. Maciejewski *(Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland) Transit of Venus and determination of the astronomical unit* **(12+3)**

16.50-17.05 Ivan Slyusarev, V. G. Shevchenko, I. N. Belskaya, Yu. N. Krugly, V. G. Chiorny *(Astronomical Institute of Kharkiv V. N. Karazin National University, Kharkiv, Ukraine) Revising of Jupiter Trojans albedos, sizes and densities* **(12+3)**

17.05-17.20 Irina Tielieusova, D. F. Lupishko *(Astronomical Institute, Kharkiv V.N. Karazin National University, Kharkiv, Ukraine) Influence of the YORP-effect on axis rotation of near-earth asteroids* **(12+3)**

17.20-17.35 Sergii Zaitsev, N. Kiselev, V. Rosenbush, F. Velicko, S. Kolesnikov, K. Antonyuk *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) Polarimetric observations of the Galilean satellites near opposition in 2011* **(12+3)**

17.35-17.40 Sandro Cervantes, C. Gay *(Center of Atmosphere Sciences, National Autonomous University, Mexico, Mexico) Initial Terraforming of Mars: first global and latitudinal temperature and pressure profiles from observational data* **(poster)**

17.40-17.45 Oleksiy Matsiaka, Yu. G. Kuznetzova *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Study of long- and short-periodic variations in Uranus spectra* **(poster)**

17.45-17.50 Edyta Popławska *(Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland) The chemical composition of Titan's atmosphere* **(poster)**

17.50-17.55 Ait Moulay Larbi El Mamoun, Z. Benkhaldoun, A. Daassou *(Université Cadi Ayyad, Marrakech, Morocco) Observation of impact flashes on the Moon* **(poster)**

17.55-18.00 Andrei Klianchin, Yu. Kuznyetsova, A. Vidmachenko, M. Andreev *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) Spectral characteristics of Jupiter's satellite Europa in the moment of eastern and western elongations* **(poster)**

18.00-18.05 Olena Shubina, P. P. Korsun *(Taras Shevchenko National University, Kyiv, Ukraine) Low-resolution spectrum of comet C/2004Q2(Machholz)* **(poster)**

18.05-18.10 Vasiliy Ponomarenko, K. I. Churyumov, V. V. Kleshchonok, O. R. Baransky *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Fluorescent cometary continuum in spectra of comets 81P/Wild 2, 103P/Hartley 2, C/2009 K5 (McNaught) and some physical parameters of these comets* **(poster)**

18.30-21.00 Excursion to the Main Astronomical Observatory of NAS of Ukraine

Tuesday, April 24

Section 'Extragalactic Astrophysics'

09.00-09.30 morning coffee

09.30-09.45 Igor Zinchenko, L. S. Pilyugin *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) Evolution of oxygen and nitrogen abundances in SDSS galaxies* **(12+3)**

09.45-10.00 Kateryna Agiienko *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) Nebular HeII λ4686 in Wolf-Rayet galaxies from SDSS* **(12+3)**

10.00-10.15 Solohery Randriamampandry *(University of the Western Cape & South African Astronomical Observatory, Cape Town, South Africa) Multi-wavelength studies of star forming galaxies in the X-ray luminous clusters at $z\sim0.5$* **(12+3)**

10.15-10.30 Ia Kochiashvili, J. Fynbo, W. Freudling, P. Møller *(DARK Cosmology Centre, Copenhagen, Denmark) On the nature of interlopers in deep narrow-band searches for $z > 7$ galaxies* **(12+3)**

10.30-10.35 Anahit Vardazaryan *(Yerevan State University, Yerevan, Armenia) Nature of intergalactic supernovae* **(poster)**

10.35-10.40 Arpine Karapetyan *(Yerevan State University, Yerevan, Armenia) Study of the nature of supernova progenitors through the metallicities of their host galaxies* **(poster)**

10.40-10.45 Ani Vardanyan, V. Adibekyan *(Byurakan Astrophysical Observatory, Byurakan, Armenia) The chemical abundance gradient and star formation rate in the galaxy M101* **(poster)**

10.45-10.50 Knarik Khachatryan, V. Adibekyan *(Byurakan Astrophysical Observatory, Byurakan, Armenia) The spectral investigation of the WR galaxy PGC 97542* **(poster)**

10.50-11.20 tea-break

11.20-12.00 Ryszard Szczerba *(Nicolaus Copernicus Astronomical Center, Toruń, Poland) Dust and formation of fullerenes in Milky Way* **(invited)**

12.00-12.15 Ievgen Vovk, A. Neronov *(ISDC Data Centre for Astrophysics, Versoix, Switzerland) Fast GeV variability of blazars: implications for emission region sites* **(12+3)**

12.15-12.30 Elzbieta Kuligowska *(Astronomical Observatory of Jagiellonian University, Kraków, Polan) Studying the FR-II giant radio galaxies with modified KDA model* **(12+3)**

12.30-12.45 Daniela-Adriana Lacatus, Alin Razvan Paraschiv, O. Tesileanu *(Research Center for Atomic Physics and Astrophysics, University of Bucharest, Magurele - Ilfov, Romania) Simulating peculiar X-shaped extragalactic radio sources* **(12+3)**

12.45-13.00 Margaryta Sobolenko, P. Berczik *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Post-Newtonian test simulations of the dynamical evolution of the super-massive black hole binaries* **(12+3)**

13.00-13.05 Olena Torbaniuk, G. Ivashchenko, O. Sergijenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Some spectral properties of the quasar UV bump* **(poster)**

13.05-13.10 Agnieszka Kuzmicz, J. Marek *(Astronomical Observatory of the Jagiellonian University, Kraków, Poland) Central black holes in giant radio quasars* **(poster)**

13.10-13.15 Anatoliy Vasylenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Determination of parameters of the active nucleus in NGC 1194 galaxy* **(poster)**

13.15-13.20 Nadiia Pulatova, I. B. Vavilova *(Crimean Astrophysical Observatory, Nauchny, Ukraine) General properties of AGN in pairs and isolated AGN from 2MIG Catalog* **(poster)**

13.20-13.25 Tahmoures Toliat Kashani, Sarah Fazlollah Pour, S. Arbabi-Bidgoli *(Ferdowsi University of Mashhad, Tehran, Iran) Extraction of the number density of galaxies in the GaBoDs data using the KSB method* **(poster)**

13.30-14.20 lunch

Section 'Cosmology'

14.30-14.45 Ganna Ivashchenko *(Astronomical Observatory of Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Mean transmission and the transmission autocorrelation function of the Ly-alpha forest from SDSS DR7* **(12+3)**

14.45-15.00 Sergii Koval, A. N. Alexandrov, V. I. Zhdanov *(National University of Kyiv-Mohyla Academy, Kyiv, Ukraine) Critical solutions and magnification of a gravitational lens near folds and cusps* **(12+3)**

15.00-15.15 Olga Sergijenko, B. Novosyadlyj *(Astronomical Observatory of Ivan Franko National University of Lviv, Lviv, Ukraine) Dark energy with barotropic equation of state: beyond the quintessential fields* **(12+3)**

15.15-15.30 Danylo Yerokhin, O. A. Lemets *(A. I. Akhiezer Institute of Theoretical Physics, National Scientific Center "Kharkov Institute of Physics and Technology", Kharkiv, Ukraine) Transient acceleration in the models with interacting holographic dark energy in fractal cosmology* **(12+3)**

15.30-15.35 Iurii Babyk, A. Elyiv, O. Melnyk, V. Krivodubskij, I. Vavilova *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) The hot diffuse gas in the X-ray galaxy clusters at* $0.01 < z < 1.4$ **(poster)**

15.35-15.40 Olga Vasylenko, G. Ivashchenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Angular clustering of photometrically classified quasar candidates from SDSS NBCKDE* **(poster)**

15.40-15.45 Natalia Arkhipova *(Astro Space Center of Lebedev Physical Institute, Moscow, Russia) Normalization constraints on* $r \equiv T/S$ *in cosmological* Λ*MDM models* **(poster)**

15.45-15.50 Oleg Lemets, D. A. Yerokhin *(A. I. Akhiezer Institute of Theoretical Physics, National Scientific Center "Kharkov Institute of Physics and Technology", Kharkiv, Ukraine) Dark sector interaction in fractal cosmology* **(poster)**

15.50-15.55 Ali Azizi *(Sanandaj Branch, Islamic Azad University, Sanandaj, Iran) Gauge invariance of free "massless" spin – 3/2 fields in de Sitter space* **(poster)**

15.55-16.15 tea-break

Section 'Astronomical Equipment and Databases'

16.15-16.30 Anna Punanova, V. V. Krushinsky *(B. N. Yeltsin Ural Federal University, Yekaterinburg, Russia) Investigation of the fiber-fed echelle spectrograph at the 1.2-meter telescope in the Kourovskaya astronomical observatory* **(12+3)**

16.30-16.45 Ivan Syniavskyi, Y. S. Ivanov *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) The Stokes polarimeter for a small telescope* **(12+3)**

16.45-17.00 Aleksander Kurek *(Solaris Center Observatory, Opole, Poland) Searching for supernovae Ia in SDSS galaxy spectra* **(12+3)**

17.00-17.05 Sergii Pokhvala, B. E. Zhilyaev, V. M. Reshetnyk *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) High-speed multicolor photometry with a CMOS receivers* **(poster)**

17.05-17.10 Nikolay Pankov, V. G. Shytov, N. F. Pankov, A. V. Belyaev *(Crimean Astrophysical Observatory, Nauchny, Crimea, Ukraine) The new control system of ZTSh dome* **(poster)**

17.10-17.15 Andrew Simon *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Possibility of spectral observations at the Lisnyky observational station of AO KNU* **(poster)**

17.15-17.20 Rouhollah Joveini, Mojtaba Taheri, Soroush Sotoudeh *(Sharif University of Technology, Tehran, Iran) Using THELI pipeline in order to reduce Abell 226 multi-band optical images* **(poster)**

17.20-17.35 Yuriy Fursiak *(Crimean Astrophysical Observatory, Nauchny, Ukraine) Creating an electronic version of the archive of spectral observations of the Sun, held at the coronagraph KG-2 of Scientific-Research Institute "Crimean Astrophysical Observatory"* **(12+3)**

17.35-17.40 Yuriy Fursiak, A. A. Shlyapnikov *(Crimean Astrophysical Observatory, Nauchny, Ukraine) On-line version of the catalog of observations of areas along the route of comet Liller (1988a)* **(poster)**

17.40-17.45 Andry Dolgov, A. Shlyapnikov *(Taurida National V. I. Vernadsky University, Simferopol, Ukraine) Catalogue of over 100,000 objects in the field of 10×10 degrees with the center Right ascension 08h40m and Declination +16° 10′* **(poster)**

17.45-17.50 Anastasiia Zolotukhina *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) The database of CCD-observations obtained at the Kyiv meridian axial circle* **(poster)**

18.00-22.00 Organ hall / opera hall / etc.

Wednesday, April 25

Section 'Stellar Astrophysics'

09.00-09.30 morning coffee

09.30-09.45 Maxim Kuznetsov, Ya. V. Pavlenko, M. C. Glvez-Ortiz *(Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine) Dust in atmospheres of M4 – M6 dwarfs* **(12+3)**

09.45-10.00 Alexandra Kalashnikova, O. V. Maryeva *(South Federal University, Rostov-on-Don, Russia) Spectral study of HD 15570, HD 15629, HD 15558* **(12+3)**

10.00-10.15 Satenik Ghazaryan, G. A. Alecian, H. A. Harutyunyan *(Byurakan Astrophysical Observatory, Byurakan, Armenia) On the question of detecting granulation signal in A and B star's CoRoT light curves* **(12+3)**

10.15-10.20 Kamal Kumar Tanti, J. Roy, K. Duorah *(Gauhati University, Guwahati, India) Spectral energy distributions and age estimates of 40 massive young stellar objects* **(poster)**

10.20-10.25 Alexandr Savushkin, A. A. Shlyapnikov *(Crimean Astrophysical Observatory, Nauchny, Ukraine) CCD photometry of some areas around of M45* **(poster)**

10.25-10.30 Nikolay Pit *(Crimean Asrophysical Observatory, Nauchny, Ukraine) Physical parameters and variable stars in the open stellar cluster Bercley 86* **(poster)**

10.30-10.35 Sergey Zubarev, E. V. Shayapin, L. M. Martyushev *(Ural Federal University, Yekaterinburg, Russia) Statistical analysis of the thermophysical quantities of star clusters* **(poster)**

10.35-10.40 Iuliia Tsykaliuk, V. Choliy *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Ogorodnikov – Milne model parametrs for analysing of PPMXL catalogue* **(poster)**

10.40-10.45 Anna Medvedeva, L. G. Lukyanov, S. A. Gasanov *(Sternberg Astronomical Institute, Moscow University, Moscow, Russia) The motion of stars in close binary systems with conservative mass exchange* **(poster)**

10.45-11.25 David Pinfield *(University of Hertfordshire, Hatfield, UK) Understanding ultra-cool atmospheres - sub-stellar objects with temperatures from 300-2300K* **(invited)**

11.25-11.55 tea-break

11.55-12.35 **Nino Chkheidze** *(Ilia State University, Tbilisi, Georgia) Anomalous pulsars and magnetars* **(invited)**

12.35-12.50 **Sviatoslav Smerechynskyi**, M. V. Vavrukh, N. L. Tyshko *(Ivan Franko National University of Lviv, Lviv, Ukraine) The inverse problem in the theory of degenerate dwarfs in the frame of two-phase model* **(12+3)**

12.50-13.05 **Vitaly Breus**, I. L. Andronov *(Odessa National Maritime University, Odessa, Ukraine) Period variations of the intermediate polar EX Hya* **(12+3)**

13.05-13.20 **Maxim Gabdeev**, N. V. Borisov, V. L. Afanasiev, V. V. Shimanskiy *(Special Astrophysical Observatory of RAS, Nizhnij Arkhyz, Russia) Study of the new polar USNO-A2.0 0825-18396733 in optical range* **(12+3)**

13.20-13.25 **Alexey Sosnovsky**, E. Pavlenko *(Crimean Astrophysical Observatory, Nauchny, Ukraine) Cataclysmic variable Star 1RXJ003828. Discovering the eclipse. Physical characteristic* **(poster)**

13.25-13.30 **Elena Nikitina**, I. F. Malov *(Pushchino Radio Astronomy Observatory, Pushchino, Russia) The distribution of areas of radiation generation at the different frequencies in the pulsar magnetospheres* **(poster)**

13.30-13.45 **Anastasiya Boiko**, A. A. Konovalenko, V. L. Kolyadin, V. N. Melnik *(Institute of Radio Astronomy of NAS of Ukraine, Kharkiv, Ukraine) Search of the radio emission from flare stars at decameter wavelengths* **(12+3)**

13.45-14.00 **Paulina Karczmarek** *(Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland) Eclipsing Binary pulsating stars – new evolutionary channel to create RR Lyr-like pulsations* **(12+3)**

14.00-14.15 **Sergey Belan**, D. N. Shakhovskoi, V. I. Shenavrin *(Crimean Astrophysical Observatory, Nauchny, Ukraine) Long-term photometric activity of RR Tau in visual and near-infrared* **(12+3)**

14.15-14.30 **Damian Jableka**, S. Zola, B. Zakrzewski *(Astronomical Observatory of Jagiellonian University, Kraków, Poland) Period changes of the sample of chromospherically active eclipsing binaries* **(12+3)**

14.30-14.45 **Krystian Iłkiewicz** *(Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland) Photometric observations of Epsilon Aurigae during the eclipse in 2009-2011* **(12+3)**

14.45-15.00 **Svetlana Artemenko**, P. P. Petrov, K. N. Grankin. *(Crimean Astrophysical Observatory, Nauchny, Ukraine) Rotational effects in classical T Tauri Stars* **(12+3)**

15.00-15.05 **Katarzyna Drozd**, E. Świerczyński *(Toruń Centre for Astronomy of the Nicolaus Copernicus University, Toruń, Poland) V407 Cyg nova-like outburst* **(poster)**

15.10-16.00 **lunch**

16.00-19.00 City tour (by bus)

19.00-23.00 Kyiv by night (walking tour)

Thurthday, April 26

Section 'High-Energy Astrophysics & Astroparticle Physics'

09.00-09.30 morning coffee

09.30-09.45 Dmytro Rogozin, B. I. Hnatyk *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Inverse Compton radiation of superconducting cosmic strings* **(12+3)**

09.45-10.00 Iryna Lypova *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Investigation of gamma/electron separation methods for array of Cherenkov telescopes* **(12+3)**

10.00-10.15 Artem Bogdan, B. I. Hnatyk, V. Marchenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) The X-ray structure of extragalactic jets* **(12+3)**

10.15-10.30 Volodymyr Marchenko, A. Bogdan *(Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine) The X-ray structure analysis of jet in 3C 273* **(12+3)**

10.30-10.45 Denis Sokolov, K. Sukach, I. Komok, V. Marchenko *(Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine) Measuring extension of sources in extragalactic jets* **(12+3)**

10.45-10.50 Bari Maqbool, R. Misr, N. Iqbal, G. Dewnagan *(University of Kashmir, Srinagar, India) Structure and stability of X-ray irradiated accretion disk* **(poster)**

10.50-10.55 Gor Oganesyan, G. M. Beskin *(Southern Federal University, Rostov-on-Don, Russia) Afterglows of gamma-ray bursts with known redshifts* **(poster)**

10.55-11.25 tea-break

11.25-12.05 Ericson Lopez *(Quito Astronomical Observatory, Quito, Ecuador) A review on GRB Models* **(invited)**

12.05-12.20 Oleksandr Sushchov, I. S. Yakymchuk, O. O. Kobzar, V. V. Marchenko, B. I. Hnatyk *(Astronomical Scientific Research Center of Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine) Sources positions for UHECR events detected by the AUGER observatory* **(12+3)**

12.20-12.35 Matthias Plum *(III. Physikalisches Institut A, Aachen, Germany) Searching for the sources of ultra high energy cosmic rays with a wavelet analysis* **(12+3)**

12.35-12.50 Mustafa Bozkurt, M. Hudaverdi, T. Ergin *Cosmic ray acceleration and high energy modelling Cas A and SNR G335.2+00.1 (Bogazici University, Istanbul, Turkey)* **(12+3)**

12.50-12.55 Mykhailo Sydorenko, B. I. Hnatyk, V. V. Marchenko *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Numerical simulation of the cosmic rays stochastic acceleration in relativistic blazar jet medium* **(poster)**

13.00-13.50 lunch

Section 'Interstellar Medium'

14.00-14.40 Ryszard Szczerba *(N. Copernicus Astronomical Center, Toruń, Poland) Water formation in envelopes of C-rich stars* **(invited)**

14.40-14.55 Vasyl Beshley, T. Kuzyo, O. Petruk *(Institute for Applied Problems in Mechanics and Mathematics, Lviv, Ukraine) Role of magnetic fields in evolution of adiabatic supernova remnants* **(12+3)**

14.55-15.10 Taras Kuzyo, V. Beshley, O. Petruk *(Ivan Franko National University of Lviv, Lviv, Ukraine) One-dimensional numerical hydrodynamical simulations of the post-adiabatic supernova remnants* **(12+3)**

15.10-15.25 Maryana Sokil, B. Ya. Melekh, O. Sagan *(Ivan Franko National University of Lviv, Lviv, Ukraine) Photoionization modelling of planetary nebulae in the Large Magellanic Cloud* **(12+3)**

15.25-15.40 Ihor Koshmak, B. Ya. Melekh *(Ivan Franko National University of Lviv, Lviv, Ukraine) The influence of stellar wind bubbles on the radiation ionizing field in HII regions* **(12+3)**

15.40-16.10 tea-break

16.10-16.25 Jayanta Dutta, R. Klessen, P. C. Clark *(Institute of Theoretical Astrophysics, Heidelberg, Germany) Angular momentum transport in primordial star formation* **(12+3)**

16.25-16.40 Erika Verebélyi, L. V. Toth *(Eotvos Lorand University, Budapest, Hungary) Herschel galactic cold cloud core analysis* **(12+3)**

16.40-16.55 Paweł Dobierski *(Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland) Fe clouds in interstellar medium* **(12+3)**

16.55-17.00 Roman Korytko, B. Ya. Melekh *(Ivan Franko National University of Lviv, Lviv, Ukraine) The energy distribution determination in the ionizing radiation spectrum of HII regions in the spiral galaxy NGC300* **(poster)**

17.00-17.05 Oleh Buhajenko *(Ivan Franko National University of Lviv, Lviv, Ukraine) Detailed method for calculation diffuse component of the radiation in nebular objects* **(poster)**

Section 'Positional Astronomy'

17.05-17.20 Victor Pap, V. P. Zhaborovskyy, M. M. Medvedsky, V. Ya. Choliy *(Main Astronomical Observatory of NAS of Ukraine, Kiyv, Ukraine) Telescope inaccuracy model based upon satellite laser ranging data* **(12+3)**

17.20-17.35 Marina Ischenko *(Main Astronomical Observatory of NAS of Ukraine, Kiyv, Ukraine) GPS reprocessing campaign in the Main Astronomical Observatory of NAS of Ukrain* **(12+3)**

17.35-17.50 Vadim Tkachuk, V. Ya. Choliy *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Comparison of the basic ephemeris "In-situ"* **(12+3)**

17.50-18.05 Roman Esselbakh, Stanislav Mel'kov *(Donbass State Technical University, Alchevsk, Ukraine) Perspective signal registration methods in the satellite laser ranging with following frequency of transmitted pulses up to 10 Hz* **(12+3)**

19.00-22.00 Conference dinner

Friday, April 27

Section 'Solar Physics and Heliosphere'

09.00-09.30 morning coffee

09.30-09.45 Olga Botygina, V. G. Lozitsky *(Astronomical Observatory of National Taras Shevchenko University, Kyiv, Ukraine) Spectropolarimetric observations of quiescent prominences, and magnetic field diagnostics* **(12+3)**

09.45-10.00 Ievgeniia Sadovenko, M. I. Pishkalo *(Astronomical Observatory of National Taras Shevchenko University, Kyiv, Ukraine) Calculation and visualisation of coronal magnetic field during total Solar eclipses of the Solar activity cycle 23* **(12+3)**

10.00-10.05 Dmitry Semenov, G. A. Sunitsa, R. K. Zhigalkin *(Crimean Astrophysical Observatory, Nauchny, Ukraine) Automatic observations of the Sun with TST-2 telescope at the Crimean Astrophysical Observatory* **(poster)**

10.05-10.10 Antonina Klyuyeva, V. G. Lozitsky *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Magnetic field measurements in a sunspot and nearest photosphere using six magnetosensitive lines with different Lande factors* **(poster)**

10.10-10.15 Olexandra Baran *(Astronomical Observatory of Ivan Franko National University of Lviv, Lviv, Ukraine) Structure of convective flows on supergranular scales in the solar photosphere* **(poster)**

10.15-10.55 Michal Sobotka *(Astronomical Institute, Academy of Sciences of the Czech Republic, Ondrejov, Czech Republic) Solar photosphere* **(invited)**

10.55-11.25 tea-break

11.25-11.40 Svetlana Glubokova, A. V. Glyantsev, S. A. Tyul'bashev, I. V. Chashei, V. I. Shishov *(Results of interplanetary scintillation observations of strong radio sources in the decline and minimum phases of cycle 23 of Solar activity) Pushchino Radio Astronomy Observatory, Pushchino, Russia* **(12+3)**

11.40-11.55 Habeeb Allawi, S. Pohjolainen *(University of Turku, Tuorla Observatory, Piikkiö, Finland) Estimated variations energy of coronal mass ejections at Solar cycle 23* **(12+3)**

11.55-12.10 Janusz Nicewicz *(Astronomical Observatory of Jagiellonian University, Kraków, Poland) Coronal mass ejections* **(12+3)**

12.10-12.25 Diana-Mihaela Dragomirescu, A. Paraschiv, **Sebastian Radu, Lucian Stan, Cristian Ivan, Dana Camelia Talpeanu**, A. D. Coman, D. Lacatus, M. Mierla *(University of Bucharest, Magurele - Ilfov, Romania) Coronal jet contribution to the slow Solar wind flux, based on STEREO/SECCHI data* **(12+3)**

12.25-12.30 Andrii Voshchepynets, V. Krasnoselskikh, O. Agapitov *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Beam plasma interaction in the inhomogeneous plasma* **(poster)**

12.30-13.20 lunch

Section 'Atmospheric Studies and Space Geophysics'

13.30-14.10 Gennadi Milinevsky *(National Taras Shevchenko University of Kyiv, Kyiv, Ukraine) Development of recent atmosphere research in Ukraine* **(invited)**

14.10-14.25 Khatuna Chargazia, G. Aburjania *(Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia) Generation and self–organization of ULF electromagnetic wave structures in the shear flow driven ionosphere* **(12+3)**

14.25-14.40 Anna Polonska, A. S. Parnowski *(Space Research Institute, Kyiv, Ukraine) Space weather forecasting using the regression approach* **(12+3)**

14.40-15.10 tea-break

15.10-15.25 Alexander Tsupko, L. V. Kozak, S. P. Savin, A. T. Y. Lui *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Extended self-similarity analysis of the turbulent processes in the boundary regions of the Earth's magnetospher* **(12+3)**

15.25-15.40 Andrew Prokhorenkov, V. Ya. Choliy *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Space-time ARIMA modeling of global TEC fields* **(12+3)**

15.40-15.55 Anton Pomazan, A. V. Ivantsov *(Research Institute "Nikolaev Astronomical Observatory", Nikolaev, Ukraine) The study of variability of the atmospheric extinction from observations at the telescope RTT-150* **(12+3)**

15.55-16.00 Kateryna Reznik, V. M. Reshetnyk *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Astroclimate parameters above the observatories of Kyiv* **(poster)**

16.00-16.05 Dmytro Saliuk, O. V. Agapitov *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Vortex and wawe structures in the plasma sheet of the Earth's magnetosphere* **(poster)**

16.05-16.10 Vlad Mogylchak, L. V. Kozak *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) The analysis of light scattering by aerosol on components of the Earth's atmosphere* **(poster)**

16.10-16.15 Valentyn Bovchaliuk *(Taras Shevchenko National University of Kyiv, Kyiv, Ukraine) Analysis of aerosol characteristics over Ukraine by Microtops II sunphotometer measurements* **(poster)**

16.15-16.20 Polya Dobreva *(Institute of Mechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria) Code optimizing algorithm for the 3D self-consistent model of the system magnetosheath-magnetosphere* **(poster)**

16.30-17.30 Poster Section + Tea-break

17.30-18.00 Official closure

Saturday, April 28

08.30-11.00 Excursions to Kyiv-Pechersk Lavra

12.00-14.00 Museum of Folk Architecture and Life of Ukraine

INVITED LECTURES

Planet formation in the context of galaxy and star formation

Eduardo Martin

INTA-CSIC Centro de Astrobiologia, Torrejón de Ardoz, Spain

ege@cab.inta-csic.es

Since the end of the XXth century, the solar system has ceased to be the only planetary system that we know about. The observed diversity of exoplanets provides a wealth of information on the processes of planet formation in the context of galaxy and star formation. Exoplanets have now been discovered in many different environments, such as the galactic bulge, globular clusters, and young open clusters, but most of them belong to the general field population. In this lecture the starting point will be the formation of galaxies, then the formation of stars within them, and finally the emergence of a large diversity of planets. Future directions on the search for exoplanets and extraterrestrial life will be discussed.

Opposition optical phenomena in planetary astrophysics

Michael I. Mishchenko

NASA Goddard Institute for Space Studies, New York, USA

michael.i.mishchenko@nasa.gov

The spectacular effect of coherent backscattering (CB) (or weak localization) of electromagnetic waves by particulate surfaces was predicted 40 years ago and has been the subject of active theoretical and laboratory research for the past two decades. Among the most salient manifestations of CB are the brightness opposition effect (BOE) and the so-called polarization opposition effect (POE). The former is observed in the form of a narrow intensity peak centered at exactly the backscattering direction. The latter is observed, with unpolarized incident light, in the form of a sharp asymmetric negative-polarization feature having a minimum at a very small phase angle. Both BOE and POE have been observed in numerous controlled laboratory experiments. However, the subtlety of these effects, the complexity and incompleteness of the corresponding theory, and the extremely infrequent occurrence of suitable scattering configurations may seem to make essentially improbable a direct and definitive detection of CB in astronomical observations of celestial objects. However, as this lecture will summarize, there is an almost unequivocal evidence that CB is present in precise, long-term photometric and polarimetric observations of sunlight reflected by high-albedo atmosphereless Solar System bodies covered with fine-grained so-called regolith surfaces.

Dust and formation of fullerenes in Milky Way

Ryszard Szczerba

Nicolaus Copernicus Astronomical Center, Toruń, Poland

szczerba@ncac.torun.pl

In my talk I will shortly review main aspects of dust formation in outflows from evolutionary advanced stars, discuss its reprocessing and survival in the interstellar medium (ISM), and underline importance of dust for star formation regions. During late stages of stellar evolution dust formation strongly depends on the carbon to oxygen ratio. In C-rich environments carbon-based dust particles form, while in O-rich cases silicates condense since almost all carbon is locked up in the CO molecule. However, mostly due to new spectroscopy from space,

this simple picture needs to be revised. I will shortly discuss the problem of dust in Galactic bulge planetary nebulae including the detection of fullerenes in the H-rich environment of some of them. The possibility of dust formation in supernova ejecta will also be addressed.

Water formation in envelopes of C-rich stars

Ryszard Szczerba

Nicolaus Copernicus Astronomical Center, Toruń, Poland

szczerba@ncac.torun.pl

In my talk I will discuss results of our survey with Herschel HIFI instrument of the lowest transitions of both ortho- and para-water in envelopes of C-rich target stars. Water was detected in all of them, in spite of the fact that thermochemical equilibrium model do not predict its formation in C-rich environment. In addition i will discuss results of HIFI observations of 10 rotational transitions of water vapor toward the carbon-rich asymptotic giant branch (AGB) star IRC+10216 (CW Leonis). IRC+10216 was the only carbon-rich asymptotic giant branch star from which thermal water emissions had been discovered, in that case with the use of the Submillimeter Wave Astronomy Satellite (SWAS). The measured line ratios imply that water vapor is present in the inner outflow at small distances from the star, confirming recent results reported by Decin et al. from observations with Herschel's PACS and SPIRE instruments. This finding definitively rules out the hypothesis that the observed water results from the vaporization of small icy objects in circular orbits. The origin of water within the dense C-rich envelopes of C-rich stars still remains poorly understood, and I will review the proposed models for its formation.

Anomalous Pulsars and Magnetars

Nino Chkheidze

Center for Theoretical Astrophysics, Institute of Theoretical Physics, Tbilisi, Georgia

n.chkheidze@gmail.com

The pulsars are believed to be highly magnetized rotating neutron stars with a broad band radiation. The study of pulsars is of great importance because of the extreme conditions existing in their environment. There are types of pulsars which properties can't be explained in the framework of well-developed pulsar emission models. These pulsars are called The anomalous pulsars. There are five general types of anomalous pulsars: The so called Soft Gamma-ray repeaters (SGR), The anomalous X-ray pulsars (AXP), Rotational Radio Transients, Compact Central Objects and The X-day Dim Isolated Neutron Stars (XDINSs). The AXPs and SGRs reveal very similar properties, a burst activity and their most interesting feature is that they possess very high surface magnetic field $B \sim 10^{14} - 10^{15}$ G. This value is much bigger than the so called Schwinger limit for the magnetic field, which makes all pulsar emission models fail to explain the observed emission of these objects. The XDINSs are a small class of neutron stars with very similar properties. They posses high magnetic field and reveal blackbody like X-ray spectra. Their study is of great importance as might play the key-role to investigate the neutron star surface directly. The investigation of anomalous pulsars might shed a new light on pulsar theory, which will play an important role for understanding the physics in extreme environment.

Understanding ultra-cool atmospheres – sub-stellar objects with temperatures from 300-2300 K

David Pinfield[1], F. Morocco[1], A. C. DayJones[2], B. Burningham[1], N. Lodieu[3], S. Leggett[4], C. Tinney[5], D. Homeier[6], Z. Zhang[1], J. Gomes[1], H. R. A. Jones[1], M. Galvez[7], R. Smart[8], L. Smith[1], S. Catalan[1], D. Murray[1], J. R. A. Clarke[1], J. Jenkins[2], C. Cardoso[8], S. Folkes[1]

[1] *University of Hertforshire, Hatfield, UK*
[2] *University of Chile, Santiago de Chile, Chile*
[3] *Institute of Astrophysics Canary Islands, Spain*
[4] *Gemini Observatory, Hawaii, USA*
[5] *University of New South Wales, Sydney, Australia*
[6] *University of Lyon, Lyon, France*
[7] *Centre for Astrobiology, Madrid, Spain*
[8] *Torino Observatory, Pino Torinese, Italy*

D.J.Pinfield@herts.ac.uk

Ultra-cool objects have now been discovered and studied in the temperature range from ∼2000 K down to ∼300 K (room temperature). They include extrasolar giant planets and sub-stellar brown dwarfs, with the simplest ultra-cool atmosphere studies possible for nearby brown dwarfs. In recent years large-scale infra-red surveys have provided the sensitivity to reveal the ultra-cool population and discover 3 new spectral classes L T and Y beyond OBAFGKM. And as these surveys grow, astronomers are able to identify even lower temperature objects, as well as rare objects in multiple systems, where the physical properties of the object can be best known. I will present a summary of ultra-cool science, focusing on observations. I will also describe the modern generation of large-scale surveys (2MASS, SDSS, UKIDSS, VISTA, WISE) in which new record breaking objects are currently being sought. I will then summarise the ultra-cool research programme of my own group, and look to some future telescopes for the future of the field.

Review on GRB Models

Ericson D. Lopez

Observatorio Astronomico de Quito de la Escuela Politecnica Nacional, Quito, Ecuador

ericsonl@hotmail.com

Gamma-ray bursts (GRBs) are flashes of gamma rays associated with extremely energetic explosions that have been observed in distant galaxies. They are the most luminous electromagnetic events known to occur in the Universe. The evolution in understanding these enigmatic events has proceeded very rapidly from the early discoveries during the cold war to the current hypernova models and stellar remnant merging models of today. In this lecture the gamma ray burst phenomenon is reviewed from a theoretical point of view with emphasis on the fireball shock scenario of the prompt emission and the longer wavelength afterglow. Recent progress and related issues are also discussed.

Solar photosphere

Michal Sobotka

Astronomical Institute, Academy of Sciences of the Czech Republic, Ondrejov, Czech Republic

msobotka@asu.cas.cz

The solar photosphere is the lowest part of the solar atmosphere, just above the convection zone. It is about 500 km high and releases the majority of radiative energy coming from the Sun. In the first part of the review, general characteristics of the photosphere, its structure (granulation, supergranulation, mesogranulation), and properties of small-scale magnetic fields are described. The second part is dedicated to sunspots and pores, their magnetic field, fine structures, and dynamics.

Development of recent atmosphere research in Ukraine

Gennadi Milinevsky

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

genmilinevsky@gmail.com

Latest results on atmosphere research development in Ukraine are discussed. Due to aerosol and ozone in the Earth atmosphere have a substantial influence on climate, they are the main objects of study for the Joint Laboratory of Atmosphere Optics and Aerosol, organized in 2008. In Ukraine the atmosphere aerosol monitoring in the framework of AERONET system is carried on using sunphotometers Cimel CE318 in Kyiv and Sevastopol. For aerosol and ozone study in other regions of Ukraine we use the mobile AERONET station which consist of two sunphotometers CE318N and hand-held Microtops II, and also two own designed experimental models of sunphotometers. The aerosol spectral optical thickness, optical and physical parameters of particles are restored: single scattering albedo, distribution of particles by sizes, complex refraction index. The total ozone content measurements and vertical distribution of ozone with the Dobson D040 spectrophotometer in the framework of the Global Atmosphere Watch Program of WMO have been started in 2010 in the new regional site of atmosphere research No 498 Kyiv-Goloseyev. The site is also equipped by the Vaisala automatic weather-station, the surface ozone 49i analyser, and experimental complex for monitoring of secondary space rays. Observational results are continuously submitted to data centers of AERONET (http://aeronet.gsfc.nasa.gov/) and WMO (www.woudc.org/data/). For aerosol and ozone research the data from satellite sources (POLDER, MODIS and OMI, SCIAMACHY) are also used. The work on a proposal to design, build, and launch the space radiometer/polarimeter for the global monitoring of atmospheric aerosols has been started recently. This device should supply by information about microphysical properties of aerosol particles. The devices description, methods and data analysis of aerosol parameters and ozone dynamics are presented. This publication is based on work supported by Award No UKG2-2969-KV-09 of the U.S. Civilian Research and Development Foundation (CRDF).

EXOPLANETS

Circumsubstellar disks SED in dependence of system parameters

Olga Zakhozhay

Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine

zkholga@mail.ru

The formulas for critical angles and areas that permit to imagine configurations of observed systems and calculate their spectral energy distributions (SEDs) as dependences on their geometrical parameters and inclination angles toward observer are obtained. Using these formulas an atlas of SEDs was created. The SEDs were calculated for the systems with very different parameters: substellar masses within the range of 0.01-0.08 $M_{\odot}$; protoplanetary disks with different inclination (0°-80°); systems ages are 1-30 Myr; substars and protoplanetary disks irradiate as black body; distance from Sun to substar equals to 10 pc; disks inner radius equals to central object radius and sublimation radius at the age of 1 Myr. The dependence of SEDs shape on systems' ages and inclinations, and substellar masses are analysed.

Polarimetric effects simulation for HD 189733

Kateryna Frantseva[1], N. M. Kostogryz[2], T. M. Yakobchuk[2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

gagarinfff@gmail.com

The main idea of our simulations was general famous effect that polarization of centrosymmetric unresolved stars is equal to zero and during the planet transiting or spot appearing on the host star, the symmetry is broken that results in partial polarization registration. We simulated the flux and polarization in different filters (U, B, V, R, I) for HD 189733 system. Monte-Carlo method for simulation of polarization that occurs at planet's transit was used. As the host star is active and spots may cover up to 1% of planetary surface, we simulated the flux, Stokes parameters for linear polarization and polarization degree for different spots' parameters such as sizes, locations on the stellar disk, temperatures.

Spectral studies of the transit system HD 189733

Yana Shliakhetskaya[1], Yu. Kuznyetsova[2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

shlyahetska_yana@ukr.net

Analysis of spectra set for the transit system HD 189733 having extrasolar planet was done. Studies are carried out to determine short-time variations for some spectral lines during transit event. Continuance of transit is 109.6 minutes. Consistent variations of such spectral line parameter as intensities, equivalent width and other, are found. Studies were done using spectral data of transit system HD 189733 obtained on April 27 – 28, 2009 during transit event. Observations of HD 189733 were carried out at 2-m telescope of the peak Terskol observatory using coude echelle spectrometer (spectral resolution R=40000–45000) within the range ∼3800–8000 Å. As the standard the solar type star 16 CygA was used.

A technique for high-precision CCD photometry of transiting extrasolar planets with the MASTER-II-Ural telescope of the Kourovka astronomical observatory

Artem Burdanov[1], V. V. Krushinsky[2]

[1] *Ural Federal University, Yekaterinburg, Russia*
[2] *Observatory of the Ural Federal University, Kourovka, Russia*

artem.bourdanov@gmail.com2

We present an observational technique and developed post-processing software program "Kit" which are used to obtain 2 milli-magnitude photometry with the MASTER-II-Ural telescope (40-cm Hamilton) of the Kourovka astronomical observatory of the Ural Federal University. This precision is sufficient to detect the transit of a short-period giant planet around solar-type star and to register subtle transit effects. 10 transits of extrasolar planets were observed. Transit light curves were uploaded to the Exoplanet Transit Database.

The sub-stellar birthrate from the UKIDSS survey

Avril Day-Jones[1], F. Marocco[2], D. J. Pinfield[2], Z. H. Zhang[2], B. Burningham[2], Deacon[4], M. T. Ruiz[1], J. Gallardo[1], H. R. A. Jones[2], P. W. L Lucas[2], J. S. Jenkins[1], J. Gomes[2], S. L. Folkes[3], J. R. A. Clarke[3]

[1] *Universidad de Chile, Santiago, Chile*
[2] *Centre for Astrophysics Research, University of Hertfordshire, Hatfield, UK*
[3] *Universidad de Valparaiso, Valparaiso, Chile*
[4] *Max-Planck Institut fur Astronomie, Heidelberg, Germany*

adjones@das.uchile.cl

We present the first results from our large 20 night XSHOOTER programme on the VLT to identify a new population of mid L-mid T dwarfs from the UKIDSS Large Area Survey to establish the birthrate of the sub-stellar galactic population.

SOLAR SYSTEM

Transit of Venus and determination of the astronomical unit

Damian Puchalski, G. Maciejewski

Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland

Damian.Puchalski@astri.uni.torun.pl

A transit of Venus across the Sun takes place when the planet Venus passes directly between the Sun and Earth, becoming visible against the solar disk. During a transit, Venus can be seen from Earth as a small black disk moving across the face of the Sun. The duration of such transits is usually measured in hours, however it occurs at most only twice in one century. In spite of its rarity, transit of Venus can be used to determine the size of the solar system by employing the parallax method and Kepler's third law. The technique uses precise observations of the slight difference in the time of either the start or the end of the transit from widely separated points on the Earth's surface. The next transit of Venus will occur on June 5 – June 6 in 2012. This will be our last chance to determine the astronomical unit in this century, using the transit of Venus.

Revising of Jupiter Trojans albedos, sizes and densities

Ivan Slyusarev, V. G. Shevchenko, I. N. Belskaya, Yu. N. Krugly, V. G. Chiorny

Astronomical Institute of Kharkiv V. N. Karazin National University, Kharkiv, Ukraine

i_slyusarev@mail.ru

CCD photometry of selected Jupiter Trojans and Hilda asteroids was carried out to investigate their magnitude-phase angle dependences in a wide range of the phase angles including extremely low angles to define more precisely absolute magnitudes of these objects. We found systematic differences in adopted magnitudes of Trojans and Hildas in the MPC database. These magnitudes were determined with the HG function that is failed to fit the observed magnitude-phase curves of Trojans. Using our data on more accurate absolute magnitudes of selected objects and new data on their sizes (NEOWISE and "Akari" surveys and occultation data) we give new estimates of their albedos. Using new radiometric diameters, we also were able to recalculated densities Trojans, that belong to the contact binary pairs. Critical review of current methods, that are used in determination of albedos, sizes and densities and our new data we present for dicussion.

Influence of the YORP-effect on axis rotation of near-earth asteroids

Irina Tielieusova, D. F. Lupishko

Institute of Astronomy of Kharkiv V. N. Karazin National University, Kharkiv, Ukraine

johnneshforbs@rambler.ru

In contrast to MBAs the distribution of rotation rates for NEAs shows excesses of fast and slow rotators. One of the possible reasons of the difference can be the so-called YORP-effect, which appears because of reflection and IR-reemission of the solar radiation by an irregular-shaped body. The YORP-effect acting depends on size, shape and body insolation. Analysing NEA rotation rates distribution and identical ones for MBAs, one can note that

the smaller average size of asteroids of fixed population, the more clearly we can see excesses of fast and slow rotators. Such dependence of rotation rates on asteroid sizes is just typical for the YORP-effect influence. That is why the analysis of an average size of NEAs in both excesses and in the middle of the distribution is of immediate interest. Axis Rotation Rates and Average Diameters: The obtained dependence shows that average size of NEAs is decreasing from the middle of the distribution of their rotation rates to its edges, i.e. the excesses of slow and fast rotators are composed by NEAs which are in average 1.5 times smaller than those in the middle of the distribution. This result is in excellent agreement with the YORP-effect influence. Axis Rotation Rates and Relative Insolation: We calculated the relative amount of solar energy, received by each NEA during a single revolution around the Sun. Correlation of the relative insolation of NEAs and their axis rotation rates shows that asteroids of both excesses are in the orbits where they receive about 8-10% of solar energy more than in orbits of NEAs which are in the middle of the distribution. Obtained correlation qualitatively agrees well with the character of possible influence of YORP-effect and can be considered as another independent argument in favour of it. This work is the first attempt to estimate statistically the YORP-effect influence not on the rotation of some particular NEAs (as it has already been done) but on the distribution of NEA rotation rates, that is, on axis rotation of the whole NEA population.

Polarimetric observations of the Galilean satellites near opposition in 2011

Sergii Zaitsev[1], N. Kiselev[1], V. Rosenbush[1], F. Velicko[2], S. Kolesnikov[3], K. Antonyuk[4]

[1] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*
[2] *Institute of Astronomy of Karazin Kharkiv National University, Kharkiv, Ukraine*
[3] *Institute of Astronomy of Odessa Mechnikov National University, Odessa, Ukraine*
[4] *Crimean Astrophysical Observatory, Nauchny, Ukraine*

johnneshforbs@rambler.ru

We present new polarimetric observations of Galilean satellites Io, Ganymede, Europe, and Callisto carried out on October 21 âĂŞ November 1, 2011. We used 125-cm telescope equipped with the UBVRI double image chopping photoelectric polarimeter, 260-cm telescope equipped with a one-channel photoelectric photometer-polarimeter, 100-cm telescope equipped with a one-channel photoelectric photometer-polarimeter (Crimean Astrophysical Observatory, Ukraine), and 70-cm telescope equipped with a one-channel photoelectric photometer-polarimeter (Chuguev Observational Station of Astronomical Institute of Karazin Kharkiv National University, Ukraine). The measurements were performed at phase angles ranging from 0.34 to 2.12 deg. Our new observations fully confirmed the presence of the polarization opposition effect for high-albedo satellites Io, Europa, and Ganymede at phase angles less than 1 deg. Within the accuracy of the measurements we did not detect the polarization opposition effect for moderate-albedo satellite Callisto.

Initial Terraforming of Mars: first global and latitudinal temperature and pressure profiles from observational data

Sandro Cervantes, C. Gay

Center of Atmosphere Sciences, National Autonomous University of Mexico, Mexico, Mexico

alainguzman@msn.com

In not so distant future, the population growth, the excessive resource demand, climate change, the threat of collision of a comet or asteroid, among other ecological, economical, political and sociological problems, could straight humanity in the path of colonize new habitats, such as the surface and deep ocean, near Earth orbital space, the moon and other planets. According to the WWF Living Planet Report, in 2007, human demand on natural resources had doubled 1966 demand. In the same year, humanity used the equivalent of 1.5 planets to support its activities, (i.e. 50% more natural resources than Earth can sustain). By 2030, more moderate United Nations forecasts on population growth, consumption and climate change, show that humanity will need two Earths capacity, to absorb CO2 waste and sustain the consumption of natural resources. Hundreds of millions of years into the future, the Sun's radiation will increase, making it impossible for our planet to sustain life as we know it today (Tokano et al., 2006). Based on the foregoing, explore, colonize and/or terraforming a planet or moon, could mark the beginning of our ability to long-term survival as a specie, and our expansion into the solar system and galaxy. To explore, colonize and terraforming a planet or moon, using probes or manned missions, it is essential to have a broad knowledge of their climate. The information obtained from NASA and ESA over the past 20 years, has enabled better understand the Martian climate and achieve successful exploration missions more effective and durable in such world. However, for this planet, there isn't a standard of its temperature and pressure, made with observed data, as there is for the land. This information is essential in the parametrization of current climate models of Mars. Considering this, we constructed latitudinal profiles of observed data with which we aim to design a global standard profile and latitudinal standard profiles of temperature, which can be applied to current numerical models used for climate, astrobiology and planetology research. For this work, we used data from the NASA's Mars Global Surveyor and Mars Pathfinder.

Study of long- and short-periodic variations in Uranus spectra

Oleksiy Matsiaka[1], Yu. G. Kuznetzova[2]

[1] *Taras Shevchenko National Univerity of Kyiv, Kyiv, Ukraine*
[2] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

matzaka@mail.ru

A comparative analysis of three spectra of Uranus to search for short- and long-period changes in these spectra was done. The analysis includes a search for changes in following characteristics of the lines such as central intensities, profiles, the equivalent widths. The spectral variations of the geometric albedo were calculated. Also we compared our results with other sources for more detailed analysis of possible causes of changes in the spectrum. This study was done using spectral data of Uranus obtained on December 1-2 and 3-4, 2008 and October 11-12, 2011. Observations of Uranus were carried out at 2-m telescope of the peak Terskol observatory using coude echelle spectrometer (spectral resolution R = 40000–45000) within the range 3600-9000 Å. As the standard the solar type star 16 CygA was used.

The chemical composition of Titan's atmosphere

Edyta Popławska

Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland

edoha@wp.pl

Titan is the only known moon with a fully developed atmosphere that consists of more than just trace gases. Observations from the Voyager space probes have shown that the Titanian atmosphere is denser than Earth's, with a surface pressure about 1.45 times that of Earth's. Titan's lower gravity means that its atmosphere is far more extended than Earth's; even at a distance of 975 km, the Cassini spacecraft had to make adjustments to maintain a stable orbit. The atmosphere of Titan is opaque at many wavelengths and a complete reflectance spectrum of the surface is impossible to acquire from the outside. It was not until the arrival of the Cassini – Huygens mission in 2004 that the first direct images of Titan's surface were obtained. Titan's atmosphere is the only dense, nitrogen-rich atmosphere in the Solar System aside from the Earth's. The atmospheric composition in the stratosphere is 98.4% nitrogen with the remaining 1.6% composed mostly of methane (1.4%) and hydrogen (0.1 – 0.2%).

Observation of impact flashes on the Moon

Ait Moulay Larbi El Mamoun[1], Z. Benkhaldoun[2], A. Daassou[2]

[1] *Université Cadi Ayyad, Marrakech, Morocco*
[2] *Oukaimeden Observatory, Morocco*

mamoun.larbi@gmail.com

When a hypervelocity projectile impacts a target, a light flash is produced at the moment of first contact. Time-resolved light intensity curves can be used to determine the starting conditions of the observed impacts. The possibility of detecting these impact from ground-based telescopes was suggested more than ten years ago. The procedure consists in evaluating the light emitted by vapour plumes for impacts with the highest velocities. It is now well established that it is possible to detect these phenomena with modest telescopes. We are creating a network of 3 telescopes involving the University Cadi Ayyad of Marrakech, Paris Observatory and Toulouse University. The development of a Franco-Moroccan Network dedicated to the observation of lunar impact flashes will allow us to realize the simultaneous observations between the Marrakech Observatory, Oukeimden Observatory (University Cadi Ayyad, Morocco) and Uranoscope of Ile de France observatory (Toulouse University and Paris Observatory, France). We used three 35 cm diameter telescopes (C14) with a Hyper-Star system to enlarge the field of observation a high speed Watec camera (720×576 pixels – 50 fps) and a GPS system to determine the flash. Observations are done between the last first quarters of each lunar month. Ufocapture software to flashes. The detections must be two different observatories or be 2 consecutive frames to take out We present our first observations different weeks of joint the multiple interests of several sites (confirmation of impact, spatial and temporal location). In order to optimise our observations, we compiled 54 flashes observations from different sources. The flash magnitude ranges from 4 to 10; 27 events belong to the Leonids shower, 12 belong to the Geminids, one is a Taurid, one is Perseid, and 13 are sporadic. A histogram of visual magnitudes, divided into three groups (the Leonids,the Geminids and Sporadics) is given in Figure 2. Two distinct magnitude distributions are derived. The observed flash magnitudes associated with Leonid meteors are in the range (3 – 10) with peak values between magnitudes 5 and 7. The distribution of Geminid and Sporadic flashes are shifted towards higher values, mostly larger than 7 – 8. The largest number of high magnitudes (9 – 10) is observed for Geminid flashes. The exposure time of each half frame is 1/60s (NTSC mode) or 1/50s (PAL/SECAM mode). The minimum flash duration observable is consequently around 0.017 or 0.02 second. We observed that brightest flashes of 4 to 7.5th magnitude have the maximum duration ranging from 0.017 to 1 second. Moreover dimmer flashes of 7.5 to 10th magnitude have the shortest duration ranging from 0.017 to 0.08 second. In first order, we can consequently observe than the brighter the flash, the longer it is. In second order, we observe a larger variability for smaller magnitude, which is due to the Leonids distribution. While the logarithms of Geminids and Sporadics flash brightness and flash duration are correlated, Leonids, which are generally brighter, have shorter duration than Geminids and Sporadics. Our compilation reveals that flashes dimmer

than magnitude 10 were never reported. A better understanding of the nature of impact flashes and of the conditions of detectability has been gained from the analysis of a compilation of magnitudes and duration of flashes for various swarms and sporadic events. This will enable us to adapt our detection facilities to improve the number of detections by testing new technical solutions (e.g. diameter of telescope, infrared cameras, sensor resolution, and acquisition speed). The integration of the Oukeimden and Marrakech observatories in this project represents a possible first-order scientific involvement in an international frame. This Franco-Moroccan network is a good opportunity to have more lunar flashes detections and to diversify observation methods in the future (IR, visible, polarized lights).

Spectral characteristics of Jupiter's satellite Europa in the moment of eastern and western elongations

Andrei Klianchin[1], Yu. Kuznyetsova[1], A. Vidmachenko[1], M. Andreev[2]

[1] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*
[2] *Terskol Branch of Institute of Astronomy, Russian Academy of Sciences, Russia*

klyanchin@ukr.net

Spectral observations of Jovian satellite Europa were carried out at 2-m telescope of the peak Terskol observatory with using of coude echelle spectrometer (spectral resolution R=45000) in the moments of opposite elongations. This satellite synchronously revolves around the planet. So, leading and trailing hemispheres of Europe were observed in moments of eastern and western elongations. Such spectral observations allow to clear the difference of characteristics for opposite satellite hemispheres generated by interaction of satellite surface with interplanetary medium in powerful Jovian magnetosphere. Using obtained spectral data we calculated the spectral variations of the geometric albedo for Europa surface in the moments of opposite elongations. We detected the differences in conforming spectral lines for two noted elongations by some line parameters (intensity, equivalent width and profiles). Also marks of sulfur bands were detected.

Low-resolution spectrum of comet C/2004Q2(Machholz)

Olena Shubina[1], P. P. Korsun[2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

belkalenaastronom@gmail.com

We made analysis of the spectroscopic data for comet C/2004Q2 (Machholz). The data were obtained at the telescope Zeiss-600 of Andrushivka astronomical observatory. The observed spectrum covers a wavelength range 3600-9200 Å. We have identified molecular-line features in the spectrum. Also we detected some molecular lines via the gas production rate using the Haser model.

Fluorescent cometary continuum in spectra of comets 81P/Wild 2, 103P/Hartley 2, C/2009 K5 (McNaught) and some physical parameters of these comets

Vasiliy Ponomarenko, K. I. Churyumov, V. V. Kleshchonok, O. R. Baransky

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

barka.08@rambler.ru

Results of observations and study of middle-resolution optical spectra of comets 81P/Wild 2, 103P/Hartley 2, C/2009 K5 (McNaught) are presented. The spectra were obtained with the echelle spectrograph and with the slit spectrograph installed on the 2-m Zeiss reflector of the High-mountain astronomical station of Institute of Astronomy of Russian Academy of Sciences and Main Astronomical Observatory of National Academy of Sciences of Ukraine at Peak Terskol in 2009-2010 years. With resolution $R = 15000$ we obtained: for 81P/Wild – 2 spectra, 103P/Hartley 2 – 9 spectra, C/2009 K5 (McNaught) – 2 spectra. With resolution $R = 1500$ we obtained: for 81P/Wild – 5 spectra, 103P/Hartley 2 – 8 spectra, C/2009 K5 (McNaught) – 4 spectra. Fluorescent cometary continuum level (nonsolar origin) in the spectra of comets was detected. Parameters of fluorescent continuum were obtained (wavelength 3800 Å $< \lambda <$ 5000 Å). Peculiarities of fluorescent continuum of this comets are discussed. The energy distributions in the spectra for the near nucleus regions of three comets are built and detailed identification of the spectral emission lines in the spectra were made. Physical parameters of the neutral comas of comets (velocities of gas expansion, lives times of molecules C_2, C_3 and CN and other parameters) were calculated using the Shulman's and Haser's models. Comparative analysis of the spectra of three comets was made.

EXTRAGALACTIC ASTROPHYSICS

Evolution of oxygen and nitrogen abundances in SDSS galaxies

Igor Zinchenko, L. S. Pilyugin

Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine

igorzinchenko@gmail.com

New expressions for the ON and NS calibrations (ON11 and NS11 calibrations) for the determination of oxygen and nitrogen abundances in HII regions are proposed. New criteria to divide the HII regions into three classes (hot, warm and cool) are also suggested. The ON11 and NS11 calibrations provide more accurate abundance determination from the global spectra in comparison to the ON and NS calibrations. The O and N abundances are estimated for a sample of 57470 SDSS galaxies using the ON11 and NS11 calibrations. The strong line flux measurements for the SDSS spectra of those galaxies were taken from the MPA/JHU catalogue. The mass – metallicity diagram for different redshifts was considered. It was found that there is no enrichment of the interstellar medium of galaxies with high masses $\lg M/M_{\odot} \gtrsim 11.3$ during the last 4 Gyrs (corresponding to the redshift interval $z = 0 - 0.4$) in both oxygen and nitrogen. This evidences in favour of that the significant star formation in those galaxies are ceased more than 4 Gyrs ago. For galaxies of lower masses, the changes in oxygen and nitrogen abundances increase with decreasing of galaxy mass.

Nebular HeII λ4686 in Wolf-Rayet galaxies from SDSS

Kateryna Agiienko

Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine

katerina.agienko@gmail.com

Primordial stars apparently were very hot and massive and emitted a lot of hard ionizing radiation. Regions of ionized hydrogen are the best places for studying such hard radiation, because of underlying starformation processes. To check a possible links between hard ultraviolet radiation and Wolf-Rayet (WR) stars we created a sample of galaxies with nebular emission line of HeII λ4686 the from Sloan Digital Sky Servey. Theoretical models predict decreasing of HeII emission line intensity with metallicity. Data from our sample did not show any significant trends. This observation is in good agreement with previous studies. Only a half of spectra from our sample show nebular HeII emission, superposed on the broad HeII emission from WR stars. This point concludes that not only WR stars are responsible for origin of nebular HeII emission, but also other mechanisms make a contribution into hard ionizing radiation at HII regions.

Multi-wavelength studies of star forming galaxies in the X-ray luminous clusters at z$\sim$0.5

Solohery Randriamampandry

University of the Western Cape & South African Astronomical Observatory, Cape Town, South Africa

solohery@saao.ac.za

We present a multi-wavelength analysis of star-forming galaxies in massive galaxy cluster MS 0451-03 ($z = 0.54$) to explore evolution in the Radio Far Infrared relationship in rich clusters at intermediate redshift. The data were reduced using the Astronomical Image Processing System (AIPS). We were able to detect a significant number of spectroscopically confirmed cluster members that have previously been identified as star-forming galaxies from the optical data. We have measured the radio flux density from deep VLA observations of the cluster, our preliminary results reaches flux down to 38μJy. In the future work, we will be working on the Infrared observations and will strengthen the present findings by analyzing an additional observations of the cluster from the EVLA.

On the nature of interlopers in deep narrow-band searches for $z > 7$ galaxies

Ia Kochiashvili[1], J. Fynbo[1], W. Freudling[2], P. Møller[2]

[1] *DARK Cosmology Centre, Juliane Maries Vej 30, Copenhagen 2100, Denmark*
[2] *European Southern Observatory*

ia@dark-cosmology.dk

A major goal of current extragalactic astrophysics is to uncover the galaxies that reionized the Universe at redshifts $z > 6$. One of the techniques used to search for these galaxies is deep narrow-band imaging in the near-IR searching for Lyman-alpha emitting galaxies. An important task in this connection is to disentangle the distant Lyman-alpha emitters from more nearby galaxies at lower redshifts with other emission lines in the narrow-band filter. In this project we characterize the interloper population by studying a sample of about 50 emission line galaxies selected from deep narrow-band imaging of the so-called GOODS-South field.

Nature of intergalactic supernovae

Anahit Vardazaryan

Yerevan State University, Yerevan, Armenia

anahit9490@mail.ru

We made an attempt to understand the nature of supernovae (SNe) that show no sign of an identifiable galaxy in their direct vicinity. There are two possible explanations of this intergalactic SNe. First, a host galaxy has too low surface brightness to be detected. By identifying and studying the low surface brightness galaxies that host some of these SNe, especially core-collapse SNe, we characterize the nature of stellar population which can produce such SNe. Second, the progenitor of the SN is a hypervelocity star that exploded far away from its host galaxy. In this respect, we focus on observations and give lower limits to the space velocities of the SNe progenitors.

Study of the nature of supernova progenitors through the metallicities of their host galaxies

Arpine Karapetyan

Yerevan State University, Yerevan, Armenia

k-arpi@mail.ru

The main goal of this study is to find out correlations between luminosity as well as metallicity of supernovae (SNe) host galaxies and the spectroscopic type of SNe. We select a sample of well-defined SNe with redshift < 0.05, and cross-match it with the Sloan Digital Sky Survey (SDSS) Data Release 7 (DR7) catalog of star-forming galaxies with measured metallicities. We find strong evidence that type Ibc SNe occur in higher metallicity hosts than type II SNe. There is a dependence of the N(Ibc)/N(II) ratio on metallicity and luminosity as well. Finally, we find metallicity dependence of the ratio of thermonuclear (Ia) to core-collapse (Ibc and II) SNe, which is interpreted in terms of the star formation properties of the host galaxies.

The chemical abundance gradient and star formation rate in the galaxy M101

Ani Vardanyan[1], V. Adibekyan[2]

[1] *Byurakan Astrophysical Observatory, Byurakan, Armenia*
[2] *Centro de Astrofisica da Universidade do Porto*

v.anivardanyan@gmail.com

This work is devoted to the study of chemical abundance gradient and star formation rate in the spiral galaxy M101. From the SDSS DR7 data base the spectra of 35 HII regions and the spectrum of the central part of the galaxy were selected. For the above mentioned emission line regions the content of heavy elements (nitrogen and oxygen) and their radial gradient in the galaxy were investigated. As one could expect, we observe an increasing gradient of the oxygen abundance toward the center of the galaxy. The $12 + \log(O/H)$ abundance changes from 7.44 to 8.58 dex. The same correlation occurs for the nitrogen $5.98 < 12 + \log(O/H) < 7.73$. Simultaneously, we observe that N/O ratio also increases toward the center, probably due to higher density of intermediate-mass stars enriching the center in nitrogen. For selected regions the star formation rate and their spherical distribution in the galaxy were also studied. Maximum star formation activity were observed in the M101_2 region (SFR = $4.1{\cdot}10^{-3}$ $M_{\odot}\mathrm{year}^{-1}$) and the mean SFR was $4.36{\cdot}10^{4} M_{\odot}\mathrm{year}^{-1}$. The surface density of SFR lies from 0.005 to 1.74 $M_{\odot} year^{-1} kpc^{-2}$ and the average is $2.22 M_{\odot}\mathrm{year}^{-1} kpc^{-2}$, which is higher than star formation activities observed in the circumnuclear regions of normal galaxies.

The spectral investigation of the WR galaxy PGC 97542

Knarik Khachatryan[1], V. Adibekyan[2]

[1] *Byurakan Astrophysical Observatory, Byurakan, Armenia*
[2] *Centro de Astrofísica da Universidade do Porto*

knarik1990@rambler.ru

A spectral investigation of the PGC 97542 WR type galaxy is carried out using the spectra obtained with BAO 2.6m telescope and those taken from SDSS DR7. Using these spectra we determined metallicity of the wall galaxy and of the nuclear region. The average (total) metallicity of PGC97542 galaxy is $12 + \log(O/H) = 8.29$, and the metallicity corresponding to the central region is equal to 8.42. We found high content of nitrogen $12 + \log(N/H) = 7.26$ (in circumnuclear region it is 7.35) which is probably due to the overabundance of WRN stars. The high ratio of N/O indicates that the galaxy contains no extremely young stellar population, but rather stars of ages $> 100 - 300 M_{\odot}$/year, required for the enrichment in nitrogen by intermediate-mass stars. The study of the star formation rate of the galaxy shows that the surface density of SFR is $\approx 2.33 M_{\odot}\mathrm{year}^{-1}\mathrm{kpc}^{-2}$ which is about 20 times higher than that for the circumnuclear regions of normal galaxies.

Fast GeV variability of blazars: implications for emission region sites

Ievgen Vovk, A. Neronov

ISDC Data Centre for Astrophysics, Observatory of Geneva, Versoix, Switzerland

Ievgen.Vovk@unige.ch

Blazars are well known for their powerful emission in the γ-ray domain. However, the exact site of production of those γ-rays remains unclear. It is often assumed that the γ-ray emission site is located outside the Broad Line Region, parsecs away from the central black hole. In what follows we argue, that temporal variability of a number of those sources, revealed by Fermi/LAT, suggests these γ-ray emission sites to be located much closer to the central supermassive black hole.

Studying the FR-II giant radio galaxies with modified KDA model

Elzbieta Kuligowska

Astronomical Observatory of Jagiellonian University, Kraków, Poland

naga.osobliwosc@gmail.com

The KDA (Kaiser, Denett-Thorpe, Alexander 1997) model of radio galaxy's dynamical evolution has been constructed on the assumption that the activity of the radio source is continuous. That implies that this model is applicable only for young radio galaxies with regular spectra. Several observations of giant radio galaxies suggest that their activity stopped some time ago (steep radio spectra). The new, extended dynamical model is supposed to describe this process. We propose a modification of the original KDA model by introducing the additional model free parameters that influences the process of radio power's ceasing after stopping the inflow of relativistic plasma to the source's extended radio structure. According to the modified model, after switching off the jet, the radio structure starts to loose its radio power. That appears in steeping of observed radio spectra towards high frequencies due to rapid synchrotron looses. Moreover, this model will allow us to determine numerically the age of the jet's cut-off (the time at which the activity stopped) by fitting the best model solution to observed radio spectra. This is important for understanding details of the processes of the nuclear activity and the possibility of its restarting.

Simulating peculiar X-shaped extragalactic radio sources

Daniela-Adriana Lacatus, Alin Razvan Paraschiv, O. Tesileanu

Research Center for Atomic Physics and Astrophysics, University of Bucharest, Magurele - Ilfov, Romania

lacatus.dana@gmail.com, paraschiv.alin.razvan@gmail.com

Peculiar morphologies have been observed among extragalactic radio sources, which present important sideways features that are yet to be explained. After obtaining the region in the parameter space for which the intended lateral extensions appear, further 2D simulations using PLUTO code were performed. For some selected sets of parameters, the effect of resolution on the simulated morphology and of a toroidal magnetic field on the propagation of the simulated jet in the stratified medium were considered.

Post-Newtonian test simulations of the dynamical evolution of the super-massive black hole binaries

Margaryta Sobolenko[1,2], P. Berczik[2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

sobolenko@mao.kiev.ua

We study the evolution of super-massive black hole (SMBH) binaries in galactic nuclei using the Post-Newtonian (PN) formalism. Our simulations include PN corrections to the binary equations of motion up to order PN3.5 and even the possible spin-spin and spin-orbit interactions. We show the evolution of the massive binary semimajor axis and eccentricity evolution depending on the mass ratio of the BH's and BH's spins. We also extensively study the gravitational waveforms signals emitted during the relativistic inspiral events.

Some spectral properties of the quasar UV bump

Olena Torbaniuk[1], G. Ivashchenko[2], O. Sergijenko[3]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Astronomical Observatory of National Taras Shevchenko University, Kyiv, Ukraine*
[3] *Astronomical Observatory of Ivan Franko National University of Lviv, Lviv, Ukraine*

el.torbaniuk@gmail.com

We present the results of analysis of quasar emission lines properties within the wavelength range 1050-1450 Å. 16 composite spectra compiled from subsamples of SDSS DR7 medium resolution quasar spectra with similar spectral indices were used, that allowed to find more tiny spectral features (known from individual high-resolution AGN spectra) than in composites compiled from spectra with different indices. The central wavelengths and line parameters along with their errors and local continuum are calculated using Markov Chain Monte Carlo method and considering each multiplet separately. The equivalent widths of separate lines or multiplets are also calculated. The obtained results show marginal or no dependence of equivalent width on the spectral index, that does not conflict with the Baldwin effect, because all the subsamples have similar mean luminosities.

Central black holes in giant radio quasars

Agnieszka Kuzmicz, J. Marek

Astronomical Observatory of the Jagiellonian University, Krakow, Poland

agn.kuzmicz@gmail.com

We analysed the optical properties of giant radio quasars (with radio structures larger than 0.7 Mpc). Up to now it is still unclear for what reason only a small fraction of radio sources reach such large sizes. Several hypothesis tried to explain this phenomenon but one has not been investigated in detail. This hypothesis assumes that the giant linear sizes of radio structures are due to internal properties of central active galactic nuclei (AGN) – their specific properties of super massive black hole and/or accretion disc. We investigated and checked if any direct relation between properties of the central "engine" and the origin of Mpc scale radio structures exists – to what degree some property of a central engine is necessary for "giants" to explain their origin, and what are the parameters (except of linear size) which distinguish them from smaller in size radio sources.

Determination of parameters of the active nucleus in NGC 1194 galaxy

Anatoliy Vasylenko

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

kvazarren@ukr.net

In this work we present the analysis of XMM-Newton observations of the active galactic nucleus in the intermediate type Sy 1.9 galaxy NGC 1195. We determined parameters of the accretion disk: the size of the innermost stable orbit and the inclination due to approximation of standard models of X-ray spectrum within $2.5 - 11.0$ keV energy band. We point out that the profile of the 6.4 keV emission line of neutral Fe Kα shows no evidence for rotation of the supermassive black hole in the galaxy core.

General properties of AGN in pairs and isolated AGN from 2MIG Catalog

Nadiia Pulatova[1], I. B. Vavilova[2]

[1]*SRI "Crimean Astrophysical Observatory", Nauchny, Ukraine*
[2]*Main Astronomical Observatory NAS of Ukraine, Kyiv, Ukraine*

nadya@mao.kiev.ua

In our work we discuss the previous results of comparison of properties of isolated AGN, selected from Catalogue 2MIG and AGN in pairs. The first version of the sample of AGN in pairs was chosen based on the NED database and consists of 109 well studied galaxies, while the sample of isolated AGNs consists of 62 galaxies. The main criterion of selection was the similar redshift distribution for $z < 0.05$, as for sample of isolated AGNs, for considering galaxies of the same age generation. For AGN in pairs the part of Seyfert 2 galaxies are 40%, and Seyfert 1 galaxies are only 6% of the sample. Basing on our previous study of isolated AGN we found, that Seyfert 2 galaxies are 41% and Seyfert 1 galaxies (with broad lines) are only 10% of the sample. This result may indicate that the isolated AGN were undergone to the gravitational interaction in the past. It means a close encounter appears capable of activating an evolution sequence where a normal galaxy becomes first a starburst, then a Seyfert 2 and finally a Seyfert 1 galaxy.

Extraction of the number density of galaxies in the GaBoDs data using the KSB method

Tahmoures Toliat Kashani[1], Sarah Fazlollah Pour[2], S. Arbabi-Bidgoli[3]

[1]*Ferdowsi University of Mashhad, Tehran, Iran*
[2]*Islamic Azad University, Tehran, Iran*
[3]*IPM Institute of North America, Madison, Wisconsin, USA*

tahmouresttk@gmail.com

The GABODS collaboration has compiled an imaging survey of the size 34 arcminutes, using the 2.2-m telescope at La Silla, with the aim of analysing this data for weak lensing. One strategy of this survey was to observe a large number of faint galaxies. Here we obtain the point spread function of the images by fitting the stars and apply it to correct the images of the galaxies. This analysis is performed according to the method of KSB. The obtained mass map is ready for further detailed statistical studies, such as the method of Bond et al. 1991.

COSMOLOGY

Mean transmission and the transmission autocorrelation function of the Ly-alpha forest from SDSS DR7

Ganna Ivashchenko

Astronomical Observatory of Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

g.ivashchenko@gmail.com

The results on the mean transmission and transmission autocorrelation function in the Ly-alpha forest region for redshifts 2.2-3.8 from the 7th release of the Sloan Digital Sky Survey. A new approach to determination of the quasar continuum level within the Ly-alpha forest region was applied. This approach involves using the composite spectra of quasars generated from the individual spectra with similar slope of the continuum redward of 1215 A. It was shown that the uncertainties in the mean transmission caused by using the composite spectra made with common approach can constitute about 20%.

Critical solutions and magnification of a gravitational lens near folds and cusps

Sergii Koval[1], A. N. Alexandrov[2], V. I. Zhdanov[2]

[1] *National University of Kyiv-Mohyla Academy, Kyiv, Ukraine*
[2] *Astronomical Observatory, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

seregacl@gmail.com

In the gravitational microlensing theory, the so-called high amplification events are associated with the source crossing of gravitational lens caustics. We consider the gravitational lens of the general form, taking into account the inhomogeneous continuous (dark) matter on the line of sight. Approximate solutions of the lens equation near caustics are sought by analytic expansions in powers of some parameter, which characterizes the closeness of the caustic. Critical solutions and amplification for the point source are found up to the first-order terms in the neighbourhood of a cusp and up to second order near a fold.

Transient acceleration in the models with interacting holographic dark energy in fractal cosmology

Danylo Yerokhin, O. A. Lemets

A. I. Akhiezer Institute of Theoretical Physics,
National Scientific Center "Kharkov Institute of Physics and Technology", Kharkiv, Ukraine

denyerokhin@gmail.com

In this work we consider a new model of interacting dark energy and dark matter with additional time dependent term within the framework of fractal cosmology. Transient acceleration appears in many models of dark energy Ω_x as the interaction between dark energy and dark matter Ω_m as in interaction-free models. One of the key features of this model is that it contains only of the transient acceleration regime. Another feature of this model (both in interacting and interacting-free cases) is the fact that even in the early stages of the evolution of the universe, its expansion was accelerated. So, this model has a finite period of accelerated expansion (inflation) in the early stages of the Universe evolution. After this transition, the

Universe enters a stage of slow expansion. The duration of this regime depends on values of the parameters, it is significant that it is limited. Transition period ends by phantom mode expansion, which tends asymptotically to $t \to \infty$. The dependence of relative density of dark matter and dark energy is also differs significantly in most models. Since the early times of the evolution of the universe, dominated by the fractal energy density

$$\Omega_f = \frac{\omega\beta^2}{6H^2t^{2(\beta+1)}} + \frac{1}{Ht},$$

where β is a dimensionless constant, the following holds $\Omega_f + \Omega_m + \Omega_x = 1$. So, the contribution of the fractal component is significant only in the early stages of the evolution of the universe. Within this model cosmological parameters depend on time in a strongly nonlinear manner. In particular, in some solutions deceleration parameter is a non-monotonic function of time, revolving between the stages of accelerated and decelerated expansion, thus demonstrating transient acceleration. The numerical solutions for some interesting cases are also shown.

The hot diffuse gas in the X-ray galaxy clusters at $0.01 < z < 1.4$

Iurii Babyk[1], A. Elyiv[2,4], O. Melnyk[3,4], V. Krivodubskij[3], I. Vavilova[4]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Institute Astrophysics and Geophysics of the Liegue University, Belgium*
[3] *Astronomical Observatory, Taras Shevchenko National University, Kyiv, Ukraine*
[4] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

babikyura@gmail.com

We present results of a large sample (∼120) of hot (∼3-12 keV) galaxy clusters based on Chandra observations. Making a full use of Chandra's spectro-imaging properties, we extracted the radial temperature and gas density profiles, and calculated the total mass profile of each cluster (under the assumption of hydrostatic equilibrium and spherical symmetry). Also, we used a large sample of clusters to build of the evolution profiles and redshift dependence of some parameters like r_s, ρ_0 for dark matter within the Navarro-Frank-White model.

Angular clustering of photometrically classified quasar candidates from SDSS NBCKDE

Olga Vasylenko[1], G. Ivashchenko[2]

[1] *Astronomical Observatory, Taras Shevchenko National University, Kyiv, Ukraine*
[2] *Faculty of Physics of Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

OlyaVasilenko@bigmir.net

The angular clustering of 230,829 photometrically selected quasar candidates from SDSS NBCKDE catalogue with photometric redshifts within the range $0.8 \leq z_{phot} \leq 2.2$ is studied with the help of the angular two-point correlation function. For this purpose own technique of the random catalogue generation was investigated and used. The obtained angular 2pCF of photometrically selected quasars within $0.6' - 40'$ scales is fitted well with the power-low $w(\theta) = (\theta_0/\theta)^\alpha$ with parameters $\theta_0 = 2.3^{+1.0}_{-0.9}$ arcsec and $\alpha = 0.87 \pm 0.06$, that agree well with previous studies of earlier releases of this catalogue, as well as with the results on clustering

of X-ray point sources which are mostly active galactic nuclei. Investigation of the sample showed that except the well-known stellar contamination of photometrically selected quasar candidates there is also a small (about 0.1%) contamination by artifacts of the automatic selection technique of point-like sources, like star formation regions in spiral galaxies or parts of interference crosses of bright stars.

Normalization constraints on $r \equiv T/S$ in cosmological ΛMDM models

Natalia Arkhipova

Astro Space Center of Lebedev Physical Institute, Moscow, Russia

arfe@yandex.ru

The normalization of the spectrum of density perturbations on temporary galaxy cluster abundance (σ_8) has been used to calculate numerically the value of the large scale CMB anisotropy ($\ell \simeq 10$) and the relative contribution of cosmological gravitational waves $r \equiv T/S$.

Dark sector interaction in fractal cosmology

Oleg Lemets, D. A. Yerokhin

A. I. Akhiezer Institute of Theoretical Physics,
National Scientific Center "Kharkov Institute of Physics and Technology", Kharkiv, Ukraine

oleg.lemets@gmail.com

We investigate interacting dark energy models in the framework of fractal cosmology. We discuss a fractal FRW universe filled with the dark energy and dark matter which interact with each other. We obtain the equation for the relative density of dark matter and dark energy and the deceleration parameter. This model demonstrates new types of evolution, which are not common to cosmological models with this type of interaction. The phase space analysis was made and the critical points were found, one of which is the attractor corresponding to an accelerated expanding Universe.

Gauge invariance of free "massless" spin – 3/2 fields in de Sitter space

Ali Azizi

Department of Physics, Sanandaj Branch, Islamic Azad University, Sanandaj, Iran

alissr2010@gmail.com

We present the free "massless" spin – 3/2 fields in de Sitter space-time with ambient space notation. We derive the field equation by using the Casimir operator of de Sitter group and then the gauge-invariant of this field is considered.

ASTRONOMICAL EQUIPMENT & DATABASES

Investigation of the fiber-fed echelle spectrograph at the 1.2-meter telescope in the Kourovskaya astronomical observatory

Anna Punanova[1], V. V. Krushinsky[2]

[1] *B. N. Yeltsin Ural Federal University, Yekaterinburg, Russia*
[2] *Kourovskaya astronomical observatory of the B. N. Yeltsin Ural Federal University, Russia*

PunanovaAnna@gmail.com

New fiber-linked echelle spectrograph made at the Astrospectroscopy laboratory SAO RAS has been installed at the Nasmyth focus of the 1.2-meter telescope in the Kourovskaya astronomical observatory. The spectral range of the spectrograph is 3900 Å to 10500 Å with a resolution R = 30000 and optical efficiency not less than 2%. Investigations presented in the work include dispersion curve calibration, ThAr atlas, tests on scattered light distribution, geometrical and temperature instability, signal-to-noise calculator, instrumental profile, radial velocity accuracy and equivalent width system determination. Also light losses such as atmosphere dispersion, errors of positioning an object on the fiber entrance, autoguiding errors are described, probable improvements are discussed.

The Stokes polarimeter for a small telescope

Ivan Syniavskyi, Y. S. Ivanov

Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine

syn@mao.kiev.ua

In the Main Astronomical Observatory NAS of Ukraine the Stokes polarimeter being developed for Celestron telescope with a mirror diameter of 360 mm. The instrument allows measuring the three Stokes parameters (I, Q, U) simultaneously. As the polarization analyser in the instrument used by the polarizing film, set in the exit pupil of the telescope, which is formed by a collimator. The analyser consists of four segments with different orientations of 0°, 45°, 90°, 135°. The Stokes polarimeter consists of a collimator, performs several functions: partial correction of field aberrations of the telescope, builds the pupil of telescope with 24 mm diameter and collimation of the light. In the pupil plane analyser is placed. It is 4 polaroid film with the orientations of 0°, 90°, 45°, 135°. Thus, the incident light is divided into four components (channels). For the spatial separation of channels used four pairs of achromatic prisms located just behind the analyser. For spectral selection the replaceable filters, such as g′, r′, i′, z′ , as well as transparent diffracting grating are used. Camera lens consist of seven components and builds 4 image of sky in the different polarization on the detector SBIG STL 1301E with the size of the sensitive area equal 20.4×16.5 mm. Spot size in the spot diagrams within spectral range of 410–850 nm for each point within the field of view $18'\times18'$, which concentrates > 95% of the energy is $32\mu m$, which corresponds to 2 pixels for the matrix. The maximum value of the distortion of the optical system of the Stokes polarimeter is 0.65%. General requirements of instrument are: Telescope - Celestron 91037-XLT; FOV – $18'\times18'$; Polarimeter effective focal length 1200 mm; Polarimeter – 3.4; Pupil size - 24 mm; Camera - SBIG STL 1301E; Pixel size – 16×16 μm; Spectral range – 410–850 nm; Filters and Diffractive grating - position for 4 filters, and 1 transparent diffractive grating (max density 100 lines/mm); Length of instrument – 760 mm; Weight of instrument – 6 kg. Structurally, the Stokes polarimeter consists of the following units. Composite tube

having sufficient rigidity, in which a collimator and block of removable diaphragm and slits are placed. The diaphragm or slit entered into the system manually. For panoramic observations with the maximum field of view $18'\times18'$ the diaphragm with size equal 32×32 mm is using.

Searching for supernovae Ia in SDSS galaxy spectra

Aleksander Kurek

Solaris Center Observatory, Opole, Poland

kurek.aleksander@interia.pl

Supernovae are used to be searched for photometrically, but this is not the only method. In our work we search the galaxy spectra form Sloan Digitized Sky Survey to find characteristic broad absorption features of SNs. Our aim is to create a catalogue of these objects useful for cosmological and other following research. In these speech I will talk about methodology of our research and result up to date.

High-speed multicolor photometry with a CMOS receivers

Sergii Pokhvala[1], B. E. Zhilyaev[1], V. M. Reshetnyk[2]

[1] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*
[2] *Taras Shevchenko National Univesity of Kyiv, Kyiv, Ukraine*

nightspirit10@gmail.com

In this work the results of usage of the budget digital camera with CMOS receiver and small telescopes for high-speed photometry are presented. For observations the digital camera Nikon D90 and telescopes Celestron $11''$, Maade $14''$ were used. The results of observations demonstrate that it's possible to do the photometry for stars of 9m with exposure of 0.03s to 4 frames per second. Penetrating power of system at the exposure of 30 s gives the possibility to get stars of 17^m (s/n∼3) and stars of 14^m also are available for photometry with accuracy $\sim0{,}01^m$. The system works in Kodak RGB color system which is close to the Johnson BVR system, that's why the transition from laboratory system to standard system is possible. The usage of CMOS receivers allows to do high-speed photometry in 3 filters at once and this gives big advantages over monochrome receivers. The first tests show that usage of the budget digital camera with CMOS receiver and small telescopes allows to do the adequate astronomical observations. The parameters of budget CMOS receivers are almost as good as parameters of color CMOS matrix.

The new control system of ZTSh dome

Nikolay Pankov, V. G. Shytov, N. F. Pankov, A. V. Belyaev

Crimean Astrophysical Observatory, Nauchny, Crimea, Ukraine

catspride@mail.ru

Issues about creation of automated control systems for telescopes were considered on example of ZTSh. The set of hardware and software staff for the new control system by electric mechanisms of the dome were presented as subsystem of the automated control of ZTSh that is being developed. The basic requirements for the developed system were formulated and the most important results of its work were presented. Half-year failure-free operation demonstrated the reliability and efficiency of the developed system.

Possibility of spectral observations at the Lisnyky observational station of AO KNU

Andrew Simon

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

andrew_simon@mail.ru

We present the first results of the test spectroscopic observations at Kyiv University. The ASP-9 spectrograph was mounted to the Cassegrain focus at AZT-14A telescope at Lisnyky observational station of Astronomical Observatory of Taras Shevchenko National University of Kyiv. Due to the bad weather last two monthes there were only some suitable nights for observations. We have obtained spectra of selected spectrophotometric standards, some planets, Be/X-ray binary X-Per, night and day sky, and star during comet transit on it. All these data give us possibility to determine a range of tasks for further investigations.

Using THELI pipeline in order to reduce Abell 226 multi-band optical images

Rouhollah Joveini, Mojtaba Taheri, Soroush Sotoudeh

Sharif University of Technology, Tehran, Iran

r.joveini@yahoo.com, mojtaba.taherii@gmail.com,
soroushsotoudeh@physics.sharif.edu

In this poster we review THELI (Erben & Schirmer, 2005), an image processing pipeline which was initially developed for Wide Field Imager (WFI) at ESO 2.2-m telescope to reduce multi-pointing optical images taken by multi chip (mosaic) CCD cameras. This pipeline reduces raw images by removing several instrumental signatures, implementing photometric calibration and astrometric alignment, and constructing a deep co-added mosaic image complemented by a weight map. We demonstrate the procedure of reducing images from raw data to the final results. The accuracy of this technique is measured. The observation was performed using the INT 2.54-m telescope WFC camera in U, B, R and I band. Science frames mostly consist of Hickson Compact Galaxies (HCGs) which we are interested in for our further scientific analyses. Emphasis is mainly placed on photometric calibration which is of great interest to us due to our scientific case. Based on the cross-association of the extracted catalogue against a reference catalogue of stellar magnitudes, zero-point calibration is performed.

Creating an electronic version of the archive of spectral observations of the Sun, held at the coronagraph KG-2 of Scientific-Research Institute "Crimean Astrophysical Observatory"

Yuriy Fursiak

Crimean Astrophysical Observatory, Nauchny, Ukraine

yuriy_fursyak@mail.ru

With the development of computer technology the sampling of observational astronomical data stored on various media has become urgent enough, with a view to their preservation and the possibility of further, faster and more accurate processing. The department of Physics of the Sun began work on creating an electronic archive of observational data obtained at coronagraph KG-2 of Scientific-research institute "Crimean Astrophysical Observatory", stored on photographic film. The project has obtained satisfactory results of the comparison part of the spectrum scan on the scanner CANON Expression 10000XL as a means of digitizing the data, and previously used by XY scanning microphotometer MF-2, which allows to use the scanner in the future to create a proper backup. It also developed a system of software that speeds up the processing of scanned data. Work is underway to minimize and eliminate potential errors. All these steps will make it possible to obtain further high-precision results of previously obtained spectroscopic observations.

On-line version of the catalog of observations of areas along the route of comet Liller (1988a)

Yuriy Fursiak, A. A. Shlyapnikov

Crimean Astrophysical Observatory, Nauchny, Ukraine

yuriy_zfursyak@mail.ru

We present the results of the on-line version of the catalogue of observations of the sky to track the comet Liller (1988a). The comet was observed at the N. D. Kalinenkov Observatory from April to June 1988. For registration the astrograph with a field of view 13 to 18 degrees was used. The negatives were scanned. For them the astrometric calibration was performed. It is possible to create a VOTable version of the catalogue of observations using interactive software sky atlas – Aladin.

Catalogue of over 100,000 objects in the field of 10×10 degrees with the center Right ascension 08h40m and Declination $+16^\circ 10'$

Andry Dolgov[1], A. Shlyapnikov[2]

[1] *Taurida National V. I. Vernadsky University, Simferopol, Ukraine*
[2] *SRI "Crimean Astrophysical Observatory", Nauchny, Ukraine*

dolgov1@mail.ru

We present a next step in creation data base of photographical archive of Crimean astrophysical observatory (CrAO). After the experimental measurement of small images (preview) available in the online archive of CrAO using the tools of the International Virtual Observatory, we have started processing the scanned photographic plates of full scale. In this paper we discuss the problem of measuring image size more 20000×20000 pixels, identifying known and unknown objects, and creating an online catalog of observations. This is catalog submitted for website of the CrAO for using with virtual tools.

The database of CCD-observations obtained at the Kyiv meridian axial circle

Anastasiia Zolotukhina

Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine

nastya@mao.kiev.ua

The preliminary online version of the database of the MAO NASU CCD – archive is constructed on the basis of the relational database management system MySQL and permits an easy supplement of database with new collections of CCD-observations, provides a high flexibility in constructing SQL-queries for data search optimization, PHP Basic Authorization protected access to administrative interface and wide range of search parameters. Methods and means of the data verification will be discussed.

STELLAR ASTROPHYSICS

Dust in atmospheres of M4 – M6 dwarfs

Maxim Kuznetsov[1], Ya. V. Pavlenko[1], M. C. Glvez-Ortiz[2]

[1] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*
[2] *Centro de Astrobiología (INTA-CSIC), Spain*

maxk.kuznetsov@gmail.com

The spectral classes (M4 – M6), effective temperatures $T_{eff} = 2700 - 2900\,\mathrm{K}$ and $\log g = 4.0 - 4.5$ are defined for five M-dwarfs. The stellar spectra were obtained on Walter Baade Telescope (6.5-m, ESO) using IMACS with resolution R = 4000. Synthetic spectra were calculated for "dust free" atmosphere model of red dwarfs - NextGen, as well as for Semi-empirical atmosphere model by Pavlenko et al. (2007). The semi-empirical model of atmosphere takes into account the effects of the presence of dust in stellar atmospheres. We determined the dust parameters for each star and demonstrated importance of the effect the concentration of TiO molecules reducing due to their condensation on dust grains to $T_{eff} < 3000\,\mathrm{K}$. It is concluded that the scattering of radiation by dust particles do not significantly affect the energy distribution in the spectra of stars considered.

Spectral study of HD 15570, HD 15629, HD 15558

Alexandra Kalashnikova[1], O. V. Maryeva[2]

[1] *South Federal University, Rostov-on-Don, Russia*
[2] *Special Astrophysical Observatory of the Russian Academy of Sciences, Russia*

ksandra45@gmail.com

We present multi-wavelength observations of three hot stars (HD 15570 (O4 If), HD 15558 (O5 III) and HD 15629 (O5 V)) in CasOB6 association. All the investigated objects have similar spectral class but they are different in luminosity. We combine optical data obtained at 6-m telescope of Special Astrophysics Observatory with space- and ground-based observations carried out with a variety of instruments. These include UV, optical and IR data from archives MAST, Elodie and Vizier. We identified about 19 spectral lines. Radial velocities and equivalent widths were determined for 19 of them. Using the radiative transfer code CMFGEN, we determine the physical parameters (luminosity, temperature, mass loss rate) and chemical composition (H, He, O, C, N and Fe) of the stars. The atmospheres of the objects are enriched in nitrogen by about a factor of 3 ($(X_N)/(X_{N_\odot}) \simeq 3$).

On the question of detecting granulation signal in A and B star's CoRoT light curves

Satenik Ghazaryan[1,2], G. A. Alecian[2], H. A. Harutyunyan[1]

[1] *Byurakan Astrophysical Observatory, Byurakan, Armenia*
[2] *Paris Observatory, Paris, France*

satenik.ghazaryan@obspm.fr

We applied the procedure written by us to HgMn targets observed both through CoRoT astero and exo channels to check its usefulness for looking for possible existence of solar-type granulation signature in their power spectrum. The point is that many articles appeared very recently considering this problem but, we did not find any paper on this issue in relation to main-sequence chemically peculiar stars. Because theoretical models based on atomic diffusion require that the atmospheres of ApBp stars have to be more stable than those of normal stars, the detection or the absence of detection of granulation in them should be an interesting information for modelling. The earliest results show that our method is an appropriate tool for the analysis of data obtained through astero and exo channels. Nowadays, solar-type granulation effect most likely has not be seen within CoRoT data for the stars we considered. This issue needs further consideration.

Spectral energy distributions and age estimates of 40 massive young stellar objects

Kamal Kumar Tanti[1], J. Roy[2], K. Duorah[1]

[1] *Gauhati University, Guwahati, India*
[2] *Indian Institute of Astrophysics, India*

research.kamal@gmail.com

We present the spectral energy distributions (SEDs) of 40 massive young stellar objects (YSOs) detected from the NIR imaging survey carried out by Varricatt et. al. (2010) and Molinari et. al (1996) and estimated their ages and masses. The SEDs of YSOs in 40 massive star forming regions has been reconstructed using 2MASS, MSX, IRAS, IRAC & MIPS, SCUBA, WISE, SPIRE and IRAM data partly available from previous works using the on-line SED Fitting tool (SED Fitter) developed by Robitaille et. al. (2006, 2007). Apart from IRAS catalogue fluxes, the fluxes in the Mid-IR and sub–mm/mm were derived directly from the images. With the help of the analysis of spectral energy distributions, we have extracted important physical and structural parameters for each of the massive young stellar objects, along with the associated circumstellar disk and envelope. The cumulative distribution of the stellar ages and masses of the massive YSOs lead to a scenario for the formation history of massive stars in their respective star forming regions.

CCD photometry of some areas around of M45

Alexandr Savushkin, A. A. Shlyapnikov

Crimean Astrophysical Observatory, Nauchny, Ukraine

sharrakka@mail.ru

We present results of research in some areas around open star cluster M45. Observations were carried out in January – February 2012. About 400 images were obtained in the V band (Johnsons system). Position of the centers of the observed areas corresponds to the maximum concentration of stars with solar-type activity. For a number of stars of magnitude V the flare activity has been identified and analysed. We present a catalogue of observations with the possibility of on-line access to the resulting images.

Physical parameters and variable stars in the open stellar cluster Bercley 86

Nikolay Pit

Crimean Asrophysical Observatory, Nauchny, Ukraine

petersola@mail.ru

Using BVRI PSF photometry for the young open stellar cluster Bercley 86 its main physical parameters were derived. It is found that interstellar extinction in the direction on the cluster varies from 0.8^m to 1.2^m, the distance modulus is around 11.1^m that mean that the distance to the cluster is 1.6 kpc. From the theoretical isochrones the age of the cluster is 10 Myear. Analysis of photometrical variability of the cluster members for γCas and βCep variables are presented. It is also found that two, possible three, stars most probably are short period massive double systems with components that demonstrate ellipsoidal variability.

Statistical analysis of the thermophysical quantities of star clusters

Sergey Zubarev, E. V. Shayapin, L. M. Martyushev

Ural Federal University, Yekaterinburg, Russia

Sergey.cl@gmail.com

There is some consistency in the behaviour of stars as an ensemble. The investigation of star clusterâĂŹs average characteristics depending on cluster age is important for this purpose. We use the effective temperature and entropy production as such characteristics. These quantities can be rather simply and accurately determined from direct photometric measurements. At the same time as well known from thermodynamics, these quantities are very important to characterize the total energy flux and the rate of evolution of the system. As far as databases of star clusters are contain a large amount of information, calculation of thermophysical parameters and their statistical analysis are automated. We made the software [http://www.starclusters.narod2.ru/] which can automatically make loading the photometric data for stars of selected star clusters (for open or globular clusters from the database Webda [http://www.univie.ac.at/webda/] and GCG [http://www.astro.unipd.it/globulars/] respectively). Based on this information the effective temperature, entropy production and its density are calculated by various methods available in the literature. Using our software, we calculate HertzsprungâĂŞRussell diagrams for stars of open clusters (luminosities versus effective temperatures) and perform statistical analysis of the temperature distribution (unimodal or multimodal types) of stars in clusters. It is found that the number of unimodal distributions decreases proportionally to clusterâĂŹs age but the number of multimodal distributions increases. We have also shown that the average values of the effective temperature, luminosity and entropy production tend to decrease with increasing cluster age.

Ogorodnikov – Milne model parametrs for analysing of PPMXL catalogue

Iuliia Tsykaliuk, V. Choliy

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

mirra_archangel@inbox.ru

General Ogorodnikov – Milne model is applicable for analysis of raw-body rotation, deformation and expansion parameters of the Galaxy. We used data from PPMXL stellar catalogue to derive these parameters. We present analysis method, results and discussion.

The motion of stars in close binary systems with conservative mass exchange

Anna Medvedeva, L. G. Lukyanov, S. A. Gasanov

Sternberg Astronomical Institute, Moscow University, Moscow, Russia

mizar-alcora@rambler.ru

During 50 years astronomers used ill-posed Pachinskij-Huanga model to determine relative orbit of close binary systems. Now we still use this model. We use numerical integration of motion equations with a glance reactive forces and attractive forces between star and overflowing substance, to calculate relative motion of stars in close binary system. We calculated elliptical orbits of close binary systems. Our results point at various influence by reactive force to orbit evolution. We determined relation between stream path and various initial velocity angles of inclination (0°, 20°, 40°, 60°, -20°, -40°, -60°, 80°); and relation between stream path and value of initial velocity (1, 0.5, 1.5, 2).

The inverse problem in the theory of degenerate dwarfs in the frame of two-phase model

Sviatoslav Smerechynskyi, M. V. Vavrukh, N. L. Tyshko

Ivan Franko National University of Lviv, Lviv, Ukraine

svjatt@gmail.com

We propose the two-phase model which describes the dwarfs with different core temperatures (degeneration extent of an electron gas), in particular "hot" white dwarfs with luminosities that exceed that of the Sun. The inner part of white dwarf is considered as two-component metallic system which consists of partly degenerate ideal relativistic electron gas and non-degenerate static nuclear subsystem (continuous classical medium). The surface layer is considered as non degenerate gas envelope. The equation of state in the Lane-Emden politrope form was obtained for this region using approximate solution of the equations of stellar structure. The equation of the hydrostatic support in the inner part of a star can be rewritten as an equation for the local chemical potential and the point where it becomes zero defines a core radius. In the surface layer we use an equation for local temperature. Our model contains the next parameters: relativistic parameter in the stellar centre $x_0 = (3\pi^2 n_0)^{1/3}\hbar/m_0 c$ (n_0 – electron concentration), isothermal core temperature T_0 and parameter of averaged chemical composition $\mu_e =< A/Z >$. The local density and temperature dependences on a radial coordinate were calculated. The expressions for mass and radius of both core as well as surface layer of a dwarf were obtained as the functions of the model parameters. The full energy dependence of a core and a surface layer on parameters x_0, T_0 was calculated. The parameters of the model for a large number of DA white dwarfs were found using their masses, radii and effective temperatures. It was shown that the observed white dwarfs' distributions by masses and radii are well consistent with energy dependence on these characteristics.

Period variations of the intermediate polar EX Hya

Vitaly Breus, I. L. Andronov

Odessa National Maritime University, Odessa, Ukraine

bvv_2004@ua.fm

We present results of period variations study of the intermediate polar EX Hya. CCD observations were obtained using the telescopes of the Tzec Maun observatory (15cm TOA-150, 40cm RC16 and 35cm BigMak) with alternatively changing filters V and R in 2010 and 2011. Also we used observations obtained from ASAS, AAVSO and WASP data archives. From the two-periodic fit, we determined the maxima timings for each series of observations (i.e. for each night). Periodogram analysis was carried out. We analysed variations of the spin period of the white dwarf in this system using published earlier and our spin maxima timings (total 451 moments since 1962). Using the most recent spin variability characteristics published by Mauche et al. (2009) P_0=0.046546484, T_0=2437699.8920 we obtained new ephemeris

$T_{max} = 2437699.89079(59) + 0.0465464808(69) \cdot E - 6.3(2) \cdot 10^{-13} \cdot E^2$, which corresponds to the characteristic time of acceleration of rotation (spin-up) of $4.67(14) \cdot 10^6$ years. As for orbital variability of EX Hya, it is more complicated. We analysed published eclipsing minima timings. The O-C diagram shows spin-up from the beginning of observations until 1978, then it changed with spin-down. Since 1986 till 2007 it showed spin-up again. Present situation is uncertain. This may indicate the existence of a third component of the system. These investigations will be continued.

Study of the new polar USNO-A2.0 0825-18396733 in optical range

Maxim Gabdeev[1], N. V. Borisov[1], V. L. Afanasiev[1], V. V. Shimanskiy[2]

[1] *Special Astrophysical Observatory of RAS, Nizhnij Arkhyz, Russia*
[2] *Kazan (Volga Region) Federal University, Russia*

crucifer.troll@gmail.com

We report the photometric, polarimetric and spectroscopic observations of a new variable star USNO-A2.0 0825-18396733. The photometric data allowed us to refine the orbital period of the system, P=$0.^d$0840848(2) (2.016h). A strong variability of circular polarization led us to the conclusion that this object is a polar (an AM Her type star). Circular polarization reached maximum value of $-25\% \pm -3$. The obtained spectra of the object reveal blue continuum and strong emission lines of hydrogen and helium. Moreover, the spectra show a C III – N III emission blend and lines of other elements. Using the emission lines of H_α, H_β and HeII (4686 Å) we computed the radial velocity curves. The measured semiamplitude to 395±10 km/sec. Using this value we obtained the estimates of mass for the components of the system $M_1 = 0.83 M_\odot$ and $M_2 = 0.2 M_\odot$, q = 0.24 (if i = 90). The Doppler maps analysis has revealed an intriguing feature, apparently, caused by effects of re-radiation on the surface of the secondary component.

Cataclysmic variable Star 1RXJ003828. Discovering the eclipse. Physical characteristics

Alexey Sosnovsky, E. Pavlenko

Crimean Astrophysical Observatory, Nauchny, Ukraine

demartin@ukr.net

We report details of follow-up observations of the cataclysmic variable 1RXJ003828. Differential BVR photometry was obtained at the Crimean Astrophysical Observatory using 2.6-meters reflector with CCD camera FLI 1001E. Light curves clearly show the eclipse with duration of 0.8 and 14 minutes. We find out the orbital period of 0.09451(1) days and components mass ratio of 0.183. Using this data we calculated the angle of system inclination and the size of the eclipsed component.

The distribution of areas of radiation generation at the different frequencies in the pulsar magnetospheres

Elena Nikitina, I. F. Malov

Pushchino Radio Astronomy Observatory of Astro Space Centre of the Lebedev Physical Institute of the Russian Academy of Sciences, Pushchino, Russia

maggika@mail.ru

It is shown that using the pulse width W_{10} and the maximal derivative C of the position angle makes possible to calculate rather precisely the ratio n of the radius of the emission cone θ to the minimal distance of the line of sight from the center of the cone. The calculated values of n are in a good agreement with visual estimates on the base of the profile forms at the frequency of order of 1 GHz. The values of n have been calculated for pulsars at wavelengths 10 and 20 cm as well. For the polar cap model ratios of n's characterize relative distances to levels of emission generation at these waves. To obtain absolute values of distances it is necessary to use some statistical relationships or as we do the model of emission generation at the local plasma frequency. All estimates are in a good agreement and give the values of distances of order several dozens of the neutron star radii. We have taken into account possible changes of the polar cap radius due to inclination of the axis of the emission cone to the rotation axis. For calculations we have used values of the inclination angle β obtained in our previous paper.

Search of the radio emission from flare stars at decameter wavelengths

Anastasiya Boiko, A. A. Konovalenko, V. L. Kolyadin, V. N. Melnik

Institute of Radio Astronomy of NAS of Ukraine, Kharkiv, Ukraine

boikoana@yandex.ua

Observations of the two M-dwarf flare stars (AD Leonis and EV Lacertae), which were carried out with the radio telescope UTR-2 (Kharkiv, Ukraine) in the range of 10–30 MHz, are presented. 167 events of radio emission from AD Leo and 73 events from EV Lac were detected in the period of 2010 – 2011. These events were considered as stellar emission using ON–OFF regime of observations. The morphology of the flare star events is considered and their parameters (frequency drift rates and durations) are analysed.

Eclipsing Binary pulsating stars – new evolutionary channel to create RR Lyr-like pulsations

Paulina Karczmarek

Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland

paulina.karczmarek@astri.uni.torun.pl

In 2011 year a discovery of a promising candidate for an RR Lyrae star in an eclipsing binary system was made. Till that time not even one case of RR Lyrae star in a binary system has been known. The pulsator's the mass is 0.26 Solar masses which is not enough to generate RR Lyr-like oscillations known from classical individual-star evolutionary path. The presence of a more massive companion is a clue that the mass transfer had to occur in the past. Therefore, Eclipsing Binary Pulsating (BEP) star, while having RR Lyr-like light curve, has completely unlike internal structure. The bulk of the star's mass was lost during the red giant phase and the partially degenerated helium core with thin hydrogen burning shell was revealed. The BEP object has been captured inside the instability strip in the RR Lyrae area and that's why confused with classical RR Lyrae pulsators. We claim that the BEP star can point a new evolutionary channel to create RR Lyr-like oscillations. We estimated how many BEPs can be found in the future observations, as well as how many BEPs have been incorrectly classified as RR Lyrae stars so far.

Long-term photometric activity of RR Tau in visual and near-infrared

Sergey Belan[1], D. N. Shakhovskoi[1], V. I. Shenavrin[2]

[1] *Crimean Astrophysical Observatory, Nauchny, Ukraine*
[2] *Sternberg Astronomical Institute, Moscow State University, Moscow, Russia*

sbelan17@gmail.com

We present JHKL-photometric observations of Ae Herbig star RR Tau demonstrating the variability not only in visual wavelengths but also in near-infrared (up to L-band). In the most red bands we detected brightness variation. This variability is different from one, observed in visual. In K and L bands there are no short minima like observed in V but slow variations exist with a time scale of about one year.

Period changes of the sample of chromospherically active eclipsing binaries

Damian Jableka[1], S. Zola[1], B. Zakrzewski[2]

[1] *Astronomical Observatory of Jagiellonian University, Kraków, Poland*
[2] *Mt. Suhora Observatory, Pedagogical University, ó, Poland*

damian.jableka@gmail.com

In this work I present results derived from analysis of the O-C behaviour of ten eclipsing binary systems: AR Lac, CG Cyg, HP Aur, MM Her, RS CVn, RT And, SV Cam, V471 Tau, WW Dra and CF Tuc. On the basis of times of minima compiled from the literature and newly determined from recent observations, it turned out that these binaries show a long term (19-91 years) modulation of their orbital periods, clearly visible in their O-C diagrams. This effect is explained in two ways: as the first possibility I consider the light time travel effect due to the presence of a third body orbiting the eclipsing system. The other explanation for the period change would be the Applegate mechanism. Within the latter hypothesis, the period modulation is caused by changes in distribution of angular momentum as a star goes through its activity cycle. It was found that in case of six systems the existence of a third star, orbiting the binary, is a more plausible explanation of observations.

Photometric observations of Epsilon Aurigae during the eclipse in 2009-2011

Krystian Iłkiewicz

Toruń Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland

krystian.ilkiewicz@astri.umk.pl

Epsilon Aurigae is a bright binary system in which an F0 supergiant is eclipsed by a dark disk around the companion every 27.1 years. Although the star is observed and studied since about two centuries it remains an unsolved mystery. The major uncertainties are related to the companion hidden in the disk and the evolutionary status of the system. For the last eclipse of Epsilon Aurigae which occurred in 2009-2011 an international observing campaign was organized. Here we present photometric observations obtained in the framework of this campaign in the Toruń Centre for Astronomy of Nicolaus Copernicus University, and the Olsztyn Planetarium and Astronomical Observatory.

Rotational effects in classical T Tauri Stars

Svetlana Artemenko, P. P. Petrov, K. N. Grankin

Crimean Astrophysical Observatory, Nauchny, Ukraine

svetlana.artemenko@mail.ru

In Classical T Tauri Stars (CTTS), surface temperature inhomogeneities, induced by magnetic activity and accretion of matter, cause the rotational modulations of both photometric and spectroscopic parameters. These effects are used to determine the rotational period of the star. We demonstrate examples of anti-phase variations in radial velocities of chromospheric emissions and photospheric absorptions, caused by the "chromospheric spots" on surface of CTTS. Using the extended photometric catalogue by Grankin et al. (2007) we derived rotational periods and amplitudes of the periodical signal in light and color variations of 31 CTTS. For five CTTS the periods are detected for the first time. The inclination of rotational axis and the equatorial velocity are also determined. We found that CTTS of 0.3–3 $M_{\odot}$ in Tau-Aur region of star formation retain nearly constant angular velocity during 1–10 Myr of their evolution. The TTS located on the radiative evolutionary tracks rotate faster than those on the convective tracks.

V407 Cyg nova-like outburst

Katarzyna Drozd, E. Świerczyński

Toruń Centre for Astronomy of the Nicolaus Copernicus University, Toruń, Poland

katarzyna.drozd@astri.umk.pl

We present spectroscopic and photometric observations of V407 Cygni obtained during 2006-2011. Our data shows the different activity stages connected with the two components of this symbiotic binary system. Cold giant exhibits pulsation characteristic for Mira-type stars. Simultaneously, classical nova outburst connected with hot white dwarf was observed in 2010. Multicolor photometry and spectra obtained in wide range are necessary to understand behaviour of such extremely binary. Our long-term observations together with gamma ray, X-ray and radio monitoring reported by other authors covered whole spectral domain and provide many useful informations about the nature of V407 Cyg.

HIGH-ENERGY ASTROPHYSICS & ASTROPARTICLE PHYSICS

Inverse Compton radiation of superconducting cosmic strings

Dmytro Rogozin[1], B. I. Hnatyk[2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Astronomical Observatory, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

Rogozin_D@ukr.net

There are various types of the topological defects which can appear during the appropriate phase transition in the expanding early Universe. According to the current theories one of them can be cosmic strings. The most interesting for astrophysics are superconducting cosmic strings, in which the massless carriers of charge can move without any resistance. Motion of a such type of string in the galactic or intergalactic magnetic fields is accompanied by generation of electric current inside the string and magnetosphere around it. Interaction of the moving magnetosphere with an ambient plasma generates a relativistic shock wave. This shock wave accelerates electrons to relativistic velocities and they appear via synchrotron and inverse Compton radiation. In our paper the fluxes and spectra of inverse Compton emission from the shocked plasma around superconducting cosmic strings are calculated for strings with various parameters and for different cases of their location. Also possibilities of strings detection by existing facilities are estimated.

Investigation of gamma/electron separation methods for array of Cherenkov telescopes

Iryna Lypova

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

lypovaya@gmail.com

The future ground-based gamma-ray astronomy experiments like CTA will possess very high sensitivity (on 1 TeV $\sim 10^{-3}$ of Crab Nebulae flux) due to the high quality of gamma/hadron separation. For energies below 500 GeV cosmic electrons significantly contribute to the background. Cosmic electrons produce extensive air showers very similar to gamma-induced ones and differing mostly by first-interaction points. Here we discuss possibilities of gamma/electron separation, exploiting stereo Cherenkov telescopes technique.

The X-ray structure of extragalactic jets

Artem Bogdan[1], B. I. Hnatyk[2], V. Marchenko[3]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Astronomical Observatory, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[3] *Astronomical Scientific Research Center of Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine*

artem.skiv@gmail.com

The X-ray internal structure of extragalactic jets are analyzed. The multi-component model of source is built to fit the observational data. The analysis was done for Chandra observations of core-dominated quasar 3C 273.

The X-ray structure analysis of jet in 3C 273

Volodymyr Marchenko[1], A. Bogdan[2]

[1] *Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine*
[2] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

volodymyr.marchenko@gmail.com

The X-ray structure of core-dominated quasar 3C273 jet is analyzed. The Chandra observational data were used. The X-ray parameters of jet structural elements are obtained. The multi-component model of jet is built to fit the observational data.

Measuring extension of sources in extragalactic jets

Denis Sokolov, K. Sukach, I. Komok, V. Marchenko

Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine

pr0view@mail.ru

The structure of extragalactic jets is investigated. The extension of structural elements of jet are analyzed. The Mexican Hat Optimization algorithm is used to calculate the sizes and associated errors of a source image.

Structure and stability of X-ray irradiated accretion disk

Bari Maqbool[1], R. Misr[2], N. Iqbal[1], G. Dewnagan[2]

[1] *University of Kashmir, Srinagar, India*
[2] *Inter-University Center for Astronomy and Astrophysics, Pune, India*

barispn1@gmail.com

We present here the mathematical approach for studying the structural changes which take place in the outer region of the accretion disk due to X-ray Irradiation. It is shown here that X-ray Source powered by accretion, modifies the outer disk structure. Our calculations for the transition radius and circularization radius in case of various low mas X-ray binaries show that X-ray irradiation becomes dominant after transition radius only in some of the low mass X-ray binaries.

Afterglows of gamma-ray bursts with known redshifts

Gor Oganesyan[1], G. M. Beskin[2]

[1] *Southern Federal University, Rostov-on-Don, Russia*
[2] *Special Astrophysical Observatory of Russian Academy of Sciences, Russia*

gorsoft@yandex.ru

We analyzed the R-band afterglow peaked light curves of 42 long-duration gamma-ray bursts with known redshifts. We classify parts of light curves to prompt and afterglow emissions. After recalculating parameters of light curves for the source frame we searched pair correlations between parameters of emissions. Correlations are interpreted by the theory of internal shocks for prompt emission and by decelerating shocks in interstellar medium for afterglows. Also strong correlation peak luminosity – redshift was found for afterglows. This result cannot be explained by selection effects and it shows the cosmological evolution of properties of interstellar medium.

Sources positions for UHECR events detected by the AUGER observatory

Oleksandr Sushchov[1], I. S. Yakymchuk[1], O. O. Kobzar[1], V. V. Marchenko[1], B. I. Hnatyk[2]

[1]*Astronomical Scientific Research Center of Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine*
[2]*Astronomical Observatory, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

authule@yandex.ru

During 2004 – 2009 the Pierre Auger Observatory had detected 69 ultra high energy cosmic rays (UHECR) with energy higher than 55 EeV. In the present work we have calculated the incoming directions of these UHECR-s into the galaxy accounting their deflection in the magnetic fields. Various most actual models of galactic magnetic field (GMF) were used in the calculations. For each model we considered the effect of magnetic field as a whole as well every separate GMF component. It was found, that using of the different models in some galaxy regions gives similar results, whereas in other regions there are significant discrepancies between them. The obtained results may be helpful to establish the correlation of the detected UHECR events with possible sources. According to the actual data the most apparent sources are the active galaxies. Thus, for the group of UHECR events detected nearby the closest active galaxy Centaurus A, it was found that depending on the chosen GMF model from 2 to 5 events could correlate with this galaxy.

Searching for the sources of ultra high energy cosmic rays with a wavelet analysis

Matthias Plum

III. Physikalisches Institut A, Aachen, Germany

plum@physik.rwth-aachen.de

The Earth is continuously hit by cosmic rays consisting of charged particles. The energy spectrum of the cosmic rays follows a power law spectrum over many decades of energy. Due to the extragalactic and galactic magnetic field these cosmic rays can lose the directional information of their origin. However at the highest energies the cosmos rays become less deflected and their arrival directions can point back to their source. The origin regions and the acceleration mechanisms of the ultra high energy cosmic rays (UHECRs) ($E \geq 10^{18}$ EeV) are still unknown. These cosmic rays can not be measured directly, but they produced by interacting with the atmosphere secondary particles. This secondary particles form an air shower, which can be detected with large ground-based detectors, like the Pierre Auger observatory. The detectors can reconstruct the energy and the arrival direction of the primary cosmic rays.Wavelets are small localized functions designed to filter local features of a defined scale out of a noise dominated background. The anisotropy analysis with wavelets is already used in various anisotropy studies of the cosmic microwave background (CMB). The wavelet 'Needlet' is a spherical wavelet designed by the CMB community and is now used to analyze

the arrival directions of the UHECRs for point sources and large scale structures. The method is applied to different Monte-Carlo source distributions and the significance of the anisotropy is tested with Monte-Carlo studies.

Cosmic ray acceleration and high energy modelling Cas A and SNR G335.2+00.1

Mustafa Bozkurt[1], M. Hudaverdi[2], T. Ergin[1]

[1] *Bogazici University, Physics Department, Istanbul, Turkey*
[2] *The Scientific and Research Council of Turkey*

mstfabzkrt@gmail.com

Supernova Remnants have long been considered to be primary source for origin of galactic cosmic rays having energies, so called knee, below 10^{15} eV. They are produced by the violent explosions of massive stars at the end of their lives. SNRs are observable in wavelengths from radio to TeV gamma-ray. Studying the X-ray and gamma-ray emissions from SNRs will lead to a better understanding of the cosmic ray acceleration mechanisms, elemental abundances, properties of ejecta and swept-up plasma. Accelerated particles from SNR shocks interact with dense molecular clouds and emit gamma rays. Generally there are two accepted models for the gamma-ray production in SNRs. The leptonic model where emission arises from Inverse Compton and Relativistic Bremsstrahlung. The other possible emission comes from the hadronic model where gamma rays are produced from decay of neutral pions originating from proton-proton interactions. Also about half of SNRs in Milky Way are observed in X-ray. The X-ray emission of SNRs results from the interactions of ejecta and swept-up matter of SNR. Bremsstrahlung and line emissions are the thermal and main X-ray emission mechanisms in SNRs. Synchrotron emission is the non-thermal contribution of X-ray emission in SNRs by charged particles in strong magnetic field Young SNRs are bright in X-ray and gamma-ray. Because amplified magnetic field triggered from diffuse shock acceleration rapidly increases the velocity of charged particles (Bell 1978). These accelerated particles emit high energy photons. First, well known young SNR Cassiopeia A is chosen to check consistency with accepted analysis results and model parameters. Then same process is applied to SNR G335.2+00.1 in order to model with data archived in Fermi, Chandra and Suzaku observatories.

Numerical simulation of the cosmic rays stochastic acceleration in relativistic blazar jet medium

Mykhailo Sydorenko[1], B. I. Hnatyk[2], V. V. Marchenko[3]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Astronomical Observatory, Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[3] *Astronomical Scientific Research Center of Taras Shevchenko Chernigiv National Pedagogical University, Chernigiv, Ukraine*

mykhailo.sydorenko@gmail.com

We investigated the acceleration of a relativistic particles (cosmic rays) in the turbulent magnetized plasma medium, similar to the created by interaction of FRI radio galaxies relativistic jets with circumnuclear and/or interstellar medium. Especially, we consider interaction of a fast particles with the Alfvén waves, distributed by Kholmogorov statistics, in the frame of the second order Fermi mechanism of cosmic ray acceleration. In test particle approach we calculated via direct numerical simulation the process of charged particles scattering on the series of Alfvén waves with amplitude and scale distributed by Kholmogorov statistics. We analyzed the different statistical properties of this process too.

INTERSTELLAR MEDIUM

Role of magnetic fields in evolution of adiabatic supernova remnants

Vasyl Beshley[1], T. Kuzyo[2], O. Petruk[1]

[1]*Institute for Applied Problems in Mechanics and Mathematics, Lviv, Ukraine*
[2]*Ivan Franko National University of Lviv, Lviv, Ukraine*

beshley.vasyl@gmail.com

There 302 supernova remnants (SNRs) are observed in our Galactic (Ferrand 2012). It is believed that a considerable part of them is on adiabatic stage of evolution. Models of SNR evolution are based only on the hydrodynamic properties of the motion of shock wave and plasma and do not include the role of magnetic fields. However, synchrotron radiation of SNRs indicates the presence of magnetic fields in these objects. Distribution of magnetic field required for modelling the emission, is calculated assuming that the magnetic field does not affect the distribution of hydrodynamic parameters inside adiabatic remnants (Reynolds 1998). This approach is consistent with analytical solutions to the problem of a strong point explosion in a gas with infinite conductivity in the presence of a weak magnetic field, which describes changes in the distribution of the magnetic field caused by motion of the shock wave (Korobejnikov 1960). A full three-dimensional numerical simulation of magneto-hydrodynamic adiabatic SNRs in the interstellar medium with uniform density and uniform distribution of the interstellar magnetic field is conducted in order to reveal the influence of magnetic field on the classical picture of SNR evolution. It is shown that, under typical characteristics of adiabatic SNRs and values of interstellar magnetic fields, the influence of magnetic field an SNR evolution may be neglected, and downstream distribution of magnetic field inside adiabatic SNR coincides with the calculations of Reynolds 1998, Korobejnikov 1960.

One-dimensional numerical hydrodynamical simulations of the post-adiabatic supernova remnants

Taras Kuzyo[1], V. Beshley[2], O. Petruk[2]

[1]*Ivan Franko National University of Lviv, Lviv, Ukraine*
[2]*Institute for Applied Problems in Mechanics and Mathematics, Lviv, Ukraine*

kuzyo.taras@gmail.com

It is common view that a model of the lifetime of supernova remnant (SNR) deals with 3 stages of evolution: free expansion, adiabatic (Sedov) and radiative (snowplow) stages. However, there is a need to treat also an intermediate post-adiabatic stage that is between the end of the adiabatic and beginning of the radiative stage. The reason of consideration of a new stage caused by different properties of blast wave and hydrodynamical flow after the epoch when adiabatic conditions are not further valid but shock cannot be characterized as fully radiative yet. There are well-known numerical and analytical solutions for adiabatic and radiative blast waves. In our work, we are going to study hydrodynamics of SNR during this transitional stage. We perform one-dimensional hydrodynamical numerical simulations of the strong blast wave including radiative cooling, with the use of the Pluto code. Namely, we implemented different computational schemas available in the code and made respective numerical simulations in order to choose integrators, Riemann solvers, smoothing functions and other features of the numerical algorithms mostly relevant for our task. These results are compared with the previous studies and allows us also to reveal main properties of the post-adiabatic flows. At the next steps, we shall include magnetic field into consideration and perform three-dimensional simulations.

Photoionization modelling of planetary nebulae in the Large Magellanic Cloud

Maryana Sokil, B. Melekh, O. Sagan

Ivan Franko National University of Lviv, Lviv, Ukraine

archerymaka@yahoo.com

We present the results of our modelling for PNe in LMC. Using self-empiric law density distribution from Golovatyy-Mal'kov the photoionization models grid of PNe in LMC was calculated. Firstly, we done internal cut-off of above density law. Then we examined situation at various PNe masses. Also we decided to do outward and inward extension of above density law. In all cases the grain presence was taken into account. To compare the models results with observed data we used "color-color" diagram obtained by Polish colleagues.

The influence of stellar wind bubbles on the radiation ionizing field in HII regions

Ihor Koshmak, B. Ya. Melekh

Ivan Franko National University of Lviv, Lviv, Ukraine

ihorkoshmak@gmail.com

Stellar superwind around starbursts forms the cavities with low density hot gas, thermalized by inverse wind shock. Young starbursts could contain compact cavities inside HII region. Diffuse ionizing radiation, that arises in the cavity could considerably affect on the ambient medium ionization. Direct wind shock forms at the outer edge of such bubble the high density thin shell that can considerably change the Lyc-spectrum shape. Distribution of density and temperature values, and other physical parameters of "bubble-like" structures were given by Weaver et al. in 1977. We decided to investigate using multicomponent photoionization modelling the influence of such "bubbles" on the ionization spectrum shape. Input spectrum of ionizing radiation was obtained from starburst model with some parameters. We analyzed starburst with different age and metallicity. The first and second inner components of such modells correspond to the hypersonic stellar wind zone and the region of shocked stellar wind respectively. The gas density and temperature distribution in these components is derived from bubble structure obtained from equations system of continuity and energy transfer including heat conductivity. The third component is a thin shell of high density gas swept-up by wind shock. The gas density in this component was obtained from isobaric condition at contact discontinuity between second and third components. The fourth component was the HII region with typical chemical contents. The evolution grid of multicomponent photoionization models with different "bubble" parameters was calculated. The contribution of components of stellar wind bubble to the observed emission lines formation was analysed. Also, we identified three types of Lyc-spectrum transformation: 1) without lack of quanta beyond Lyman limit; 2) with lack of quanta beyond Lyman-continuum limit (this lack was formed by third component); and 3) partial case with lack of quanta beyond Lyman-continuum limit when in "bubble" the excess of quanta is formed.

Angular momentum transport in primordial star formation

Jayanta Dutta, R. Klessen, P. C. Clark

Institute of Theoretical Astrophysics, Heidelberg, Germany

J.Dutta@stud.uni-heidelberg.de

The angular momentum of a molecular cloud core is orders of magnitude larger than the angular momentum of a star. Clearly angular momentum must be lost or redistributed during the star formation process. Here we report the results from three dimensional, SPH simulations of a rotating self-gravitating primordial molecular cloud. Interestingly the angular momentum profile follows the characteristic power-law even though for different initial condition. We have shown the evolution of gravitational and hydrodynamical torque for the change of angular momentum during star formation. We further attempt to understand the dynamics of gas particle and the effect of radial gravitational acceleration on angular momentum transport during collapse. We also discuss the mass accretion phenomenon that might be related to the evolution of angular momentum during the formation of primordial protostar.

Herschel galactic cold cloud core analysis

Erika Verebélyi, L. V. Toth

Eotvos Lorand University, Budapest, Hungary

everebelyi@astro.elte.hu

In the Herschel Galactic Cold Cloud Cores Key-program we found 106 cores which are not very well known objects. Because of the selection process, these cores come from the very different part of our galaxy, thus we expect that these slightly more than one hundred cores represent the crowd of the cold cores in the galaxy well. Based on this assumption, we start a deep individual investigation of these cores. On a chosen source the method of the investigation in which we calculate the most important parameters will be shown. The comparison of the Herschel PACS and SPIRE continuum data, extended with ground-based molecular line spectra measurements to previous studies will be presented. As the birthplace of the stars, the cores star formation notion is also relevant. Therefore we analysed the YSO in the core and its environment.

Fe clouds in interstellar medium

Paweł Dobierski

Centre for Astronomy of Nicolaus Copernicus University, Toruń, Poland

pawel_dobierski@poczta.onet.pl

Using spectra from UVES with very high signal to noise ratio (above 1000) we were able to find a new kind of interstellar clouds where we can see only iron lines (3860 Å). This objects are extremely rare. We have found only 4 examples in our whole sample of spectra. In this clouds we have not found either detectable atomic (other then iron) or molecular features (CN, CH), as well any diffuse interstellar bands which, as commonly believed, are carried by some complex, organic molecules. It looks like that this clouds occupy different volumes from the well-known HI clouds.

The energy distribution determination in the ionizing radiation spectrum of HII regions in the spiral galaxy NGC 300

Roman Korytko, B. Ya. Melekh

Ivan Franko National University of Lviv, Lviv, Ukraine

DIZELSAURON@ukr.net

The energy distributions in the ionizing radiation spectrum of the different HII regions in spiral galaxy NGC 300 were determined on the base of the results of the observations as well as electron densities and temperatures with ionic abundances from Fabio Bresolin, Wolfgang Gieren et al. (2009). For this purpose the NLEHII method was used. The resulting Lyc-spectra with other data were used for calculation of the optimized photoionization models of the mentioned above HII regions. Also the dust abundance was taken into account. As a result, the optimal Lyc-spectra of the ionizing sources in different HII regions were obtained. We plan to use these Lyc-spectra for the grid photoionization modelling of HII regions in spiral galaxies, and for correct derivation of the new expressions for ionization-correction factors.

Detailed method for calculation diffuse component of the radiation in nebular objects

Oleh Buhajenko

Ivan Franko National University of Lviv, Lviv, Ukraine

olegbugaenko@gmail.com

To calculate diffuse radiation of different nebulas most of PhM codes use on the spot (OTS) or outward only (OUT) approximations. OTS assumes that diffuse radiation is absorbed in place of its emission, while OUT assumes that it spreads only in outward direction. In some situations it is not correct to use these approximations. For this purpose we decided to implement in Cloudy detailed method, which considers 3D geometry of nebula objects.

POSITIONAL ASTRONOMY

Telescope inaccuracy model based upon satellite laser ranging data

Victor Pap[1], V. P. Zhaborovskyy[1], M. M. Medvedsky[1], V. Ya. Choliy[1,2]

[1] *Main Astronomical Observatory of NAS of Ukraine, Kiyv, Ukraine*
[2] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

vic@mao.kiev.ua

New method of constructing telescope inaccuracy model is described. Procedures of the data collection, data processing and model construction are presented. Telescope encoders countings were obtained during satellites laser ranging are used as input data for constructing the model. The model is presented as the harmonical series with frequencies obtained by maximum entropy spectral analysis method.

GPS reprocessing campaign in the Main Astronomical Observatory of NAS of Ukraine

Marina Ischenko

Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine

marina@mao.kiev.ua

In 2008 the International GNSS Service (IGS) started a reprocessing campaign of archival observations in order to obtain consistent time series of products for the entire period of observation including precise ephemerides for GPS satellites in the IGS05 coordinate frame. In 2010 the Working Group of the European Permanent GNSS Network (EPN), that is a regional densification network in Europe, decided to carry out reprocessing data for GNSS stations of EPN network using precise ephemerides received in the IGS reprocessing campaign (EU0 solution). Reprocessing GPS observations for 29 GPS stations located in the Eastern Europe for GPS weeks 1326 – 1399 (September 14, 2003 – November 4, 2006) was carried out at the MAO Local Analysis Centre of GNSS. Reprocessing was done according to the new IGS recommendations (MA1 solution). The existence of the EPN combined solution allows to obtain the Helmert transformation parameters between MA1 and EU0 solutions and check the quality of the MA1 solution. Also the comparison of the MA1 solution with the regular solution received in the MAO (MAO solution) was made. For comparison purposes the conversion of coordinates for the MAO solution from the IGS00b coordinate frame into the IGS05 was made. To compare the solutions Helmert transformation parameters between the solutions MA1 and MAO were computed. Obtained results allow to suggest that the quality of the reprocessing performed at the MAO Local Analysis Centre corresponds to the EPN reprocessing. The resulting files of the MA1 solution in the SINEX and TROPEX formats are available on the MAO ftp server.

Comparison of the basic ephemeris "In-situ"

Vadim Tkachuk[1], V. Ya. Choliy[1,2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Main Astronomical Observatory of NAS of Ukraine, Kyiv, Ukraine*

vadimol92@gmail.com

There are three fundamental ephemeris in astronomy now. These are LeDe from JPL (USA), Inpop from Paris Observatory (France) and Epm from IPA (Russia). We made in-situ comparison of these ephemerides for determination of their precision and errors. It was show that all of them have comparable level of precision and differ on the level of tenth of percent.

Perspective signal registration methods in the satellite laser ranging with following frequency of transmitted pulses up to 10 Hz

Roman Esselbakh, Stanislav Mel'kov

Donbass State Technical University, Alchevsk, Ukraine

diabazer@ukr.net

As in a modern Earth satellite laser ranging (SLR) there is a tendency to shortening of transmitted pulses, than devices of a time binding are not limiting accuracy SLR-systems any more. For the further increase of accuracy there are some methods. It is possible to consider the perspective methods based on the control of echo pulse amplitude and compensating propagation time of a signal in a photodetector. This article is about research of those methods and apply at Alchevsk scientific laser station observation of artificial Earth satellites.

SOLAR PHYSICS & HELIOSPHERE

Spectropolarimetric observations of quiescent prominences, and magnetic field diagnostics

Olga Botygina, V. G. Lozitsky

Astronomical Observatory of National Taras Shevchenko University, Kyiv, Ukraine

botygina86@gmail.com

A data set of Stokes spectropolarimetric observations of Hα and HeD3 lines in quiescent prominences have been performed with the polarimeter at the echelle spectrograph of the horizontal solar telescope in Astronomical Observatory of National Taras Shevchenko University. The observational technique allows to obtain measurements free from seeing induced spurious effects. The observed Stokes-profiles are interpreted according to the theory of the Zeeman effect with the goal to obtaining information of the magnetic field range. The results are presented giving emphasis on a few interesting Stokes-profiles. We show some new prominence observations in the Hα hydrogen and D3 helium lines. The quiescent prominences measurements were performed between September and November 2011 in different positions: in HeD3 and in Hα lines. Using horizontal solar telescope it was possible to obtain a data set of Stokes spectropolarimetric measurements of 4 quiescent prominences. The observations indicate that the effective magnetic fields involved are around 300 G. In one measurement of quiescent prominence, amplitude magnetic fields up to 1000 G were found.

Calculation and visualisation of coronal magnetic field during total Solar eclipses of the Solar activity cycle 23

Ievgeniia Sadovenko, M. I. Pishkalo

Astronomical Observatory of National Taras Shevchenko University, Kyiv, Ukraine

ievgeniia86@gmail.com

Coronal magnetic field was calculated by a potential field extrapolation using a Potential Field Source Surface (PFSS) model. Wilcox Solar Observatory photospheric magnetic field were used. Classical approach with integration from 2.5 solar radii (source surface distance) to photosphere were used in coronal field modelling and for calculation of spherical harmonic coefficients. Coronal field line maps at the source surface distance were constructed in potential classical line-of-sight approximation with adding the polar field corrections in range from 100 to 1500. Observed structure of the solar corona and calculated coronal magnetic field during total solar eclipses on March 9, 1997; February 26, 1998; August 11, 1999; June 21, 2001; December 4, 2002; November 23, 2003; April 8, 2005; March 29, 2006 and August 1, 2008 were compared and analysed.

Automatic observations of the Sun with TST-2 telescope at the Crimean Astrophysical Observatory

Dmitry Semenov, G. A. Sunitsa, R. K. Zhigalkin

Crimean Astrophysical Observatory, Nauchny, Ukraine

dmitry_s88@mail.ru

Automatic observations of the Sun are carried out at TST-2 telescope after the upgrade of its mechanics and electronics components. In this work we present the main stages of the upgrading and first results of observations.

Magnetic field measurements in a sunspot and nearest photosphere using six magnetosensitive lines with different Lande factors

Antonina Klyuyeva[1], V. G. Lozitsky[2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Astronomical observatory of Taras Shevchenko National University, Kyiv, Ukraine*

a.klyuyeva@gmail.com

We studied magnetic field in the greatest sunspot of active region NOAA 1289, which was observed of 12 September 2011 on echelle spectrograph of horizontal solar telescope of Astronomical observatory of Kyiv Taras Shevchenko National University. This sunspot had two separate umbras with magnetic strengths of 2600 and 2800 G, both of S polarity. The echelle Zeeman spectrogram was obtained in 08:03:15 UT, and it allows to study the Stokes spectra $I \pm V$. Six magnetosensitive FeI lines were used for magnetic field diagnostics, namely 5247.1, 5247.6, 5250.2, 5250.6, 6301.5 and 6302.5 Å with Lande factors 2.0, 2.5, 3.0, 1.5, 1.67 and 2.5, respectively. Three places were studied: a) sunspot umbra, b) sunspot penumbra and c) nearest photosphere. For a) case, we used the direct method based on measurements of splitting of "center of gravity" of Zeeman sigma-components. From such measurements, one can obtain the magnetic field module from data of lines with greatest Lande factors (in particular, FeI 5250.2 and 6302.5). Lines with smallest Lande factors allow to measure the longitudinal magnetic field. If we compare both these data, then we can obtain the angle of the field inclination with respect to the line-of-sight. For b) and c) cases, the observational evidences were found of small-scale (subtelescopic) magnetic field structure. Namely, measured magnetic fields were found some different for spectral lines with different Lande factors. This result can be interpreted as manifestation of presence of two-component field contains weak background field and small-scale strong field. In this case, observed Stokes V_{obs} picture forms as a result of interflowing two Stokes V "waves": first from background field V_{backgr} and second – from small scale (perhaps – fluxtube) field $V_{fluxtube}$. If we combine the observational data for lines with different Lande factors then the true magnetic field parameters can be found. Such approach (similar to "line-ratio" technique) gives kilogauss magnetic fields both in penumbra and nearest photosphere.

Structure of convective flows on supergranular scales in the solar photosphere

Olexandra Baran

Astronomical Observatory of Ivan Franko National University of Lviv, Lviv, Ukraine

baran@astro.franko.lviv.ua

The study of the velocity field of the real solar convection was performed using neutral iron line $\lambda \approx 639,3$ nm profile from the observations of N. Shchukina on the 70-cm German Vacuum Tower Telescope (Canary Islands) taken around the center of the solar disc in the non-perturbed region with high spatial resolution.The inverse procedure was applied for each profile to reproduce the velocity field in the solar photosphere along two spatial coordinates: its depth, h, and the coordinate along the spectrograph slit, X. By $k - \omega$ filtration we selected motions with horizontal velocities than 0.5 km/s. The method of filtering the spatial frequencies was used to select convective structures of isolated scales (mesogranulation – more then 10 Mm, supergranulation - more then 30 Mm). As the lifetime of the supergranule is

larger than the observation time, we have averaged obtained images of the vertical velocity in time. Supergranulation becomes more apparent on the distribution of the vertical velocity (the range of ΔV variations on the supergranular scales is constrained by ± 0.04 km/s). The velocity field within such cells has been studied. The variations of the vertical velocity of supergranulation increase with heights in contradistinction to decreasing of the velocity variations of the mesogranulation. The upward supergranular flows expand with the height and the distribution of the line of sight velocity inside supergranular flows become more asymmetric in the higher layers of the photosphere. The downward supergranular flows are more compact and have a complicated structure too.

Results of interplanetary scintillation observations of strong radio sources in the decline and minimum phases of cycle 23 of Solar activity

Svetlana Glubokova, A. V. Glyantsev, S. A. Tyul'bashev, I. V. Chashei, V. I. Shishov

Pushchino Radio Astronomy Observatory, Lebedev Physics Institute, Russian Academy of Science, Pushchino, Moscow Region, Russia

glubokovask@yandex.ru

We report the results of observations of interplanetary scintillations of the 3C 298 and 3C 48 radio sources during low solar activity, performed with a BSA FIAN radio telescope at frequency of 111 MHz. We obtained the radial dependences of the scintillation indices, where the effect of a low-latitude heliospheric current sheet is observed. Based on the scintillation time spectra, the solar wind velocity values have been obtained, and it has been indicated that these values are in good agreement with those found using the diversity reception method.

Estimated variations energy of coronal mass ejections at Solar cycle 23

Habeeb Allawi, S. Pohjolainen

University of Turku, Tuorla Observatory, Piikkiö, Finland

haball@utu.fi

We have been calculating the energy of coronal mass ejections (CMEs) before and after acceleration location with every first protons injection time for 20 events at solar cycle 23 by using data from SOHO/LASCO measurements. We are able to see clearly that energy increases when height of CMEs are increasing. We found that at the minimum height, velocity and coronal electron density have energy at 1.23724×1023 Joule, while in the maximum it is 1.23726×1023 Joule, that means the variation of average energies is in between the minimum and maximum is 2×1018 Joule. In our paper we will present interesting results energy variations of CMEs before proceed to interplanetary medium.

Coronal mass ejections

Janusz Nicewicz

Astronomical Observatory of Jagiellonian University, Kraków, Poland

astrojohny@gmail.com

Coronal mass ejections are one of the most powerful phenomena on the Sun. CMEs plays a very important role in space weather. Using the solar software to analyse data from STEREO satellites we can measure physical parameters of CME, in example its velocity, width and acceleration. We can compare results with data from SOHO/LASCO catalogue.

Coronal jet contribution to the slow Solar wind flux, based on STEREO/SECCHI data

Diana-Mihaela Dragomirescu[1], A. Paraschiv[1,2], Sebastian Radu[1], Lucian Stan[1], Cristian Ivan[1], Dana Camelia Talpeanu[1], A. D. Coman[1], D. Lacatus[1,2], M. Mierla[1,3]

[1] *University of Bucharest, Magurele - Ilfov , Romania*
[2] *Institute Of Geodynamics "Sabba S. Stefanescu" of the Romanian Academy, Romania*
[3] *Research Center for Atomic Physics and Astrophysics, University of Bucharest, Romania*

radu.sbt@gmail.com, standlucian@yahoo.com, yocristik@yahoo.com, owl_nebula_m97@yahoo.co.uk

The slow solar wind is a continuous flux of charged particles (speeds around 400 km/s) that are ejected from the Sun's atmosphere. The sources of this flux have not been clearly identified. Coronal jets are proposed as a possible candidate. They are small collimated ejections of plasma seen in white-light coronographs. Using an existing catalogue, jet activity during the Solar minimum of 2007-2008 was analysed, and the ejected particle flux of each event has been estimated. Using this data, average fluxes can be obtained and used to assess the coronal jet contribution to the slow solar wind. First results are now presented.

Beam plasma interaction in the inhomogeneous plasma

Andrii Voshchepynets[1], V. Krasnoselskikh[2], O. Agapitov[1,2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Laboratoire de Physiue et Chimie de l'Environnement et de l'Espace (LPC2E/CNRS), Orleans, France*

woschep@gmail.com

Type III solar radiobursts generation is long standing problem of space plasma physics. It is widely accepted that the mechanism of generation is due to electron beam-plasma interaction. It is supposed that the emission on fundamental frequency (plasma frequency) and its harmonics (twice the plasma frequency) are due to nonlinear processes involving Langmuir waves primarily generated by the electron beam. On the other hand this process result in very short length of relaxation, of the order of several hundred kilometres while the electron beams are observed in the interplanetary space on the level of the Earth and Jupiter. This contradiction is known as Sturrock paradox. Recent studies onboard Wind and Stereo satellites have demonstrated that the level of density fluctuations in the interplanetary space is very high. This leads to re-formulation of the problem of beam plasma interaction in the strongly inhomogeneous plasmas. In this case the length of the beam relaxation can become much larger than in the homogeneous plasmas. Our aim is to evaluate these effects in application to type III solar radiobursts and to estimate the effects of particle acceleration that accompany this process.

ATMOSPHERIC STUDIES & SPACE GEOPHYSICS

Generation and self–organization of ULF electromagnetic wave structures in the shear flow driven ionosphere

Khatuna Chargazia, G. Aburjania

Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia

khatuna.chargazia@gmail.com

The generation and further linear and non-linear dynamics of planetary ultra-low-frequency (ULF) waves are investigated in the rotating dissipative ionosphere in the presence of inhomogeneous zonal wind (shear flow). Planetary ULF magnetized Rossby-type waves appear as a result of interaction of the medium with the spatially inhomogeneous geomagnetic field. An effective linear mechanism responsible for the intensification and mutual transformation of large scale magnetized Rossby type and small scale inertial waves is found. For shear flows, the operators of the linear problem are not self-adjoint, and therefore the eigen functions of the problem maybe non-orthogonal and can hardly be studied by the canonical modal approach. Hence it becomes necessary to use the so-called nonmodal mathematical analysis. The nonmodal approach shows that the transformation of wave disturbances in shear flows is due to the non-orthogonality of eigen functions of the problem in the conditions of linear dynamics. Using numerical modelling, it is illustrated the peculiar features of the interaction of waves with the background flow as well as the mutual transformation of wave disturbances in the ionosphere. It has been shown that the shear flow driven wave perturbations effectively extract an energy of the shear flow increasing own energy and amplitude. These perturbations undergo self organization in the form of the nonlinear solitary vortex structures due to nonlinear twisting of the perturbation's front. Depending on the features of the velocity profiles of the shear flows the nonlinear vortex structures can be either monopole vortices or vortex streets and vortex chains.

Space weather forecasting using the regression approach

Anna Polonska, A. S. Parnowski

Space Research Institute, Kyiv, Ukraine

polonka2008@ukr.net

Most of the methods for short-term forecasting of space weather have a common feature: they lead to a regression relation at some point, so it seems natural to skip all the preliminary steps and instantly use the regression analysis without unnecessary multiplication of entities. This idea is implemented in the regression modelling method. The regression modelling approach provides accurate short-term forecasts of geomagnetic indices, which serve as quantitative characteristics of space weather. The proposed method is statistical, but has some features of empirical models. It is based upon the regression analysis and the mathematical statistics. This approach involves inductive construction of a regression relation between output and input values. Also it can provide accurate short-term and medium-term forecasts and gives new information about the underlying physics, thus contributing to the solar-terrestrial physics. Using this method we developed models of the geomagnetic indices Dst, ap and Kp which allow to forecast them with 3 hours lead time, and the linear prediction efficiency of 60 – 80%. The linear correlation coefficient is 80 – 90%. The software utilizing this method is fast enough to be used in operations.

Extended self-similarity analysis of the turbulent processes in the boundary regions of the Earth's magnetosphere

Alexander Tsupko[1], L. V. Kozak[1], S. P. Savin[2], A. T. Y. Lui[3]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Space Research Institute of Russian Academy of Sciences, Moscow, Russia*
[3] *Johns Hopkins University, Applied Physics Laboratory, Laurel, Maryland, USA*

wayle2010@ukr.net

The turbulent regions are non-linear systems with a huge number of degrees of freedom. Precise determination of the mathematical dependence on time of the velocity fields, temperature, pressure etc. cannot be given. The analysis of such a system can be performed using only the statistical methods which describe the statistical properties of the flows' ensembles. Moreover, the most important thing during consideration is the study of turbulence properties depending on the scales. This study is dedicated exactly to the examination of statistical features of the magnetic field fluctuations in the boundary regions of the Earth's magnetosphere at different timescales. The satellite 'Cluster' measurements during 2004 – 2009 were used. Herewith the analysis of magnetic field fluctuations was performed as the characteristics of turbulent processes. Examination of the structure functions of high orders (up to 9th) allowed to determine the character of turbulent processes and to examine the diffusion in the considered regions. The significant difference of turbulent processes' type in the solar wind plasma and in the magnetosheath was obtained, and also the presence of superdiffusion in the boundary regions of the Earth's magnetosphere. The study is supported in part by the project No. F40.2/053.

Space-time ARIMA modeling of global TEC fields

Andrew Prokhorenkov, V. Ya. Choliy

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

andrew.prokhorenkov@gmail.com

In this work the computational efficiency of ARIMA modelling of global TEC fields is studied. Numerical experiment have been provided to determine better p– and q– degrees of model. Parameter estimation and forecasts have been done for several valuable time periods. We present first results and future prospects.

The study of variability of the atmospheric extinction from observations at the telescope RTT-150

Anton Pomazan, A. V. Ivantsov

Research Institute "Nikolaev Astronomical Observatory", Nikolaev, Ukraine

anton@nao.nikolaev.ua

The atmospheric extinction is determined using observations of Landolt standard fields from Russian-Turkish Telescope RTT-150 performed in BVRI Johnson-Cousins-Bessell system from 57 nights over 2005-2009 years. A simple 3-component model for the extinction was used for analysis. The Rayleigh scattering and ozone absorption have been accepted as well known, that made it possible to distinguish aerosol scattering from observations. The dependence of atmospheric extinction from time is discussed.

Astroclimate parameters above the observatories of Kyiv

Kateryna Reznik, V. M. Reshetnyk

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

plazma313@gmail.com

There are few papers on determination extinction coefficients and the night-sky brightness of the Kyiv observatories. The correct processing of the photometric data needs to evaluate and take into account the atmospheric transparency. We processed images from observation station "Lisnyky" (AZT-8) and the Main Astronomical Observatory of the National Academy of Sciences of Ukraine (Celestron CGE-1400) for 2009. We used two different methods to determine the extinction coefficient in a spectral range λ. First, there is a brief Bouguer method which consists in observing two standard stars at the various zenith distances z. The ratio of the difference in magnitude to the difference in air masses gives extinction coefficient. Second, there is Sarychev method which basic assumption is that during the period of observations of three stars extinction coefficient changing linearly with time. The results agree well with the estimated extinction coefficient for the other middle latitudinal observatories. We also found seeing for all images. The night-sky brightness was calculated using images of the standard stars in the different filters. We obtained the color index of the night-sky $B - V = 0.6$.

Vortex and wawe structures in the plasma sheet of the Earth's magnetosphere

Dmytro Saliuk[1], O. V. Agapitov[1,2]

[1] *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
[2] *Laboratoire de Physiue et Chimie de l'Environnement et de l'Espace (LPC2E/CNRS), Orleans, France*

dima.ubf@gmail.com

We used the data of Interball-1 for study of the low-frequency wave activity in the plasma layer of the Earth magnetosphere. In some cases, vortex structures of monopole and dipole type is observed with the waves Pc 5. Their transverse size is 1600–5600 km and velocity of 4–16 km/sec. The numerical scheme based on the numerical integration methods is proposed for study dynamics of the initial perturbations of vortex structures with vector non-linearity. The integration was carried out on a grid with constant step by implicit scheme. We have considered theoretical models describing the dynamics of vortex structures and suggested a conservative numerical scheme for the study of stability of these structures, taking into account non-linear parts. Studies generally indicate the existence of energy transport in the magnetotail due to nonlinear solitary waves and vortices. These events were marked during the analyse Interball-1 measurements.

The analysis of light scattering by aerosol on components of the Earth's atmosphere

Vlad Mogylchak, L. V. Kozak

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

mogylchakvlad@ukr.net

Aerosol significantly influences on the processes of scattering and absorption of electromagnetic waves in the atmosphere. The analysis of light scattering by aerosol is divided into two parts: a single particle light scattering and weakening of light on aggregate particles. It should be noted that the question of weakening the light in which dispersive structure of aerosol environment was taken into account, remains open. For analysing of incident radiation scattering on atmospheric aerosols were calculated indicatrix of scattering using theory Mi. Calculations were carried out for these groups of aerosols: continental, marine, and stratospheric. It was studied the influence of light wavelength, size and type of particles on features of scattering indicatrix. It was found that with increasing wavelength of incident electromagnetic radiation scattering the indicatrix is similar to Rayleigh, dispersion increases forward and decreases backward with increasing particle size, also fluctuations occur and the best scattering properties of atmosphere components have sulfuric acid, and the worst – soot.

Analysis of aerosol characteristics over Ukraine by Microtops II sunphotometer measurements

Valentyn Bovchaliuk

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine

bovchaliukv@gmail.com

The atmospheric aerosols are produced by various sources of natural and anthropogenic origin, and present a very large diversity in size and chemical composition. Study of aerosols and their impact on climate are based on measurements of stationary ground-based networks, develop and implement new and improved satellite sensors and measurement using portable sunphotometers. Poster represents the preliminary results of aerosol characteristics obtained during 2008-2011 using portable multi-wavelength sunphotometer Micrtotops II. Measurements were collected at different cities such as Kyiv, Odessa, Kharkiv, Lugansk, Rivne, Kryvyi Rig. Main physical aerosol characteristics have been received from observations: aerosol optical thickness and Angstroem parameter. Aerosol pollution in Ukraine was analysed and data were compared to the Europe aerosol content in atmosphere. Four various serial No of instruments were used during investigated period. Therefore the algorithm was developed that allowed to create aerosol database with different accuracy (version 1.0, 1.5 and 2.0). Furthermore, Langley and transfer calibrations of Microtops II instrument were executed. The calibration transfer was realized using Cimel AERONET sunphotometer that placed at Main Astronomical Observatory in Kyiv.

Code optimizing algorithm for the 3D self-consistent model of the system magnetosheath-magnetosphere

Polya Dobreva

Institute of Mechanics, Bulgarian Academy of Sciences, Sofia, Bulgaria

polya2006@yahoo.com

The proposed three dimensional model makes use of two earlier developed 3D regional numerical models: grid characteristic model of the magnetosheath and finite element model of the magnetosphere, developed at the Institute of Mechanics, Bulgarian Academy of Sciences. The determination of the geometry and position of the boundaries is a part of self-consistent solution. This consideration requires solution of two principal tasks: a) finding an appropriate algorithm and a numerical procedure ensuring the pressure balance an the magnetopause, b) construction of new appropriate 3D finite elements set in the magnetosphere region at each time step. The model outputs are the distribution of gas-dynamic parameters in the magnetosheath and the distribution of magnetic field in the magnetosphere. Positions of bow shock and the magnetopause are also determined as part of the solution. The source code of the

described algorithm is written in Fortran programming language. In order to modernize and extend the existing simulation software, several performance optimization techniques were applied to the source code. Also parts of the code are parallelized using OpenMP directives. The simulations run on several multicore x86-64 machines under 64-bit Windows OS. Some preliminary numerical experiments, performed on different configuration of the computer platform are discussed.

Table of Contents