

INSTITUTE OF THEORETICAL PHYSICS AND ASTRONOMY OF VILNIUS UNIVERSITY



A. Goštauto 12, LT-01108 Vilnius

Tel. +370 5 262 09 47, fax +370 5 212 53 61

E-mail atom@itpa.lt

Director – Habil. Dr. *Gražina Tautvaišienė*

STAFF

66 researchers and other investigators (13 habilitated doctors, 38 doctors, and 7 doctoral students). Full staff comprises 104 persons. Planetarium employs the staff of 19 persons.

STRUCTURE

Astronomical Observatory (AO)

Head – Habil. Dr. *Gražina Tautvaišienė*, tel. 261 09 59

Department of the Theory of Atom (DTA)

Head – Prof. Habil. Dr. *Zenonas Rokus Rudzikas*, tel. 262 06 68, 261 36 51

Department of the Theory of Nucleus (DTN)

Head - Habil. Dr. *Sigitas Ališauskas*, tel. 262 11 25

Department of the Theory of Processes and Structures (DTPS)

Head – Prof. Habil. Dr. *Bronislovas Kaulakys*, tel. 262 08 59

Sector of Isotopic Analysis (SIA)

Head – Prof. Habil. Dr. *Petras Serapinas*, tel. 261 19 30

Chair of Studies

Head – Dr. *Gintaras Merkelis*, tel. 261 05 02

The Institute is the Incorporator of Planetarium in Vilnius

Director – *Danutė Sperauskienė*, tel. 272 41 77

MAIN RESEACH TRENDS AND INTERESTS

The Institute has the following main research directions approved by the Government of the Republic of Lithuania:

Development of effective methods of mathematical physics and their application to theoretical investigation of many-particle systems, their nonlinear dynamics and of quantum fields

Studies of atoms, subatomic particles, molecules, their structures and plasma spectroscopy, their application to nanophysics and astrophysics

Investigations of the structure and evolution of the Galaxy, stars and interstellar matter

The principal subjects of research in the Departments of the Institute in 2006:

stellar photometry and spectroscopy, classification of stars, Galactic structure and dynamics, interstellar extinction, modeling of stellar systems, orbits of small bodies of the Solar system (AO)

theoretical atomic spectroscopy, methods of the theory of complex atomic and ionic spectra, development of quantum many-body theory, processes of the interaction of polarized atoms with polarized electrons and photons; algorithms and computer programs for fusion plasma physics and astrophysics (DTA)

development of the algebraic techniques of the nuclear and particle physics, investigations of microscopic collective models of atomic nuclei, the quantified field models of elementary particles (DTN)

dynamical processes in the strongly driven nonlinear systems; structure of spectra of molecules; model Hamiltonian matrices and the graph-theoretical models; quantum optics of

dielectrics; quantum electrodynamics, photophysical processes; Bose-Einstein condensates; phase transitions; fluctuations and noise, theory of 1/f noise; econophysics and physics of finance (DTPS)

highly sensitive chemical measurements by methods of optical spectrometry, metrology of chemical measurements, their application to the environmental science (SIA)

DOCTORAL DISSERTATIONS MAINTAINED IN 2006

O. Scharf. On the Theory of Hyperfine Structure of Many-Electron Atoms

J. Zdanavičius. Interstellar Extinction in the Direction of the Camelopardalis Dark Clouds.

J. Ruseckas. Measurement Models for Quantum Zeno and Anti-Zeno effects and Time Determination in Quantum Mechanics

CONFERENCES AND SEMINARS ORGANIZED IN 2006

Third Annual Meeting COST Action P10 "Physics of Risk" and Workshop on "Complex System Science", <http://physrisk.itpa.lt>

EUROMET/METCHEM "Metrology in Chemistry Technical Sub-Committee Meeting. Inorganic Analysis Working Group"

First BalticGrid Conference <http://www.balticgrid.org>

International Seminar Discussion "Strong and Competitive Astronomy in Europe"

International Conference "10 Yars for Stromvil Photometric System"

International Seminar "Cold Atomic Gases and Interaction of Light with Matter"

Meeting of the Organizing Committee "The NordForsk High Astrophysical Courses"

Summer School "ESO Data Basis and Their Applications", <http://www.itpa.lt>

The Tutorial Courses "European Organization for Nuclear Research – CERN Reveals Mysteries of the Structure of Matter", " , <http://www.itpa.lt>

RESEARCH PROJECTS CARRIED OUT IN 2006

Projects Supported by Institute Budget

The Chemical Composition and Evolution of Stellar Atmosphere. Habil. Dr. G. Tautvaišienė. 2005–2009.

Positional Astrometry of Unusual Asteroids and Comets. Dr. K. Černis. 2005–2009.

Investigation of the Possibilities of the Spectrophotometric Classification of Reddered Stars. Habil. Dr. K. Zdanavičius. 2006–2009.

Optical Properties of Cold Atoms and Condensed Structures: Development of the Theory. Habil. Dr. G. Juzeliūnas. 2005–2009.

Theoretical Studies of Electron Spectra and Chemical Reactivity of Polyatomic Compounds. Habil. Dr. V. Gineitytė. 2005–2009.

Investigation of Subatomic Systems and their Dynamics by the Methods of Group Theory and Topology. Habil. Dr. S. Ališauskas and Dr. E. Norvaišas. 2006–2010.

The Properties of Atomic nuclei and their Interaction with Leptons. Dr. A. Juodagalvis. 2006–2008.

The Cascades in Complex Atoms and Their Influence on X-ray and Auger Spectra: Theory and Interpretation. Prof. R. Karazija. 2005–2009.

Theoretical Investigation of Polarisation Phenomena in Atomic Processes. Dr. A. Kupliauskienė. 2002–2006.

Development of Methods to Account for Relativistic and Correlation Corrections and Their Application in Investigation of Discrete Spectra of Heavy and Medium-heavy Atoms. Prof. P. Bogdanovich. 2002–2006.

Modern Modelling of Problems in Theory of Atom on the Basis of Conventional and Symbolic Programming. Prof. G. Gaigalas. 2003–2007.

Visual Binary and Multiple Stars of Population II: Astrometric, Photometric and Kinematic Characteristic. Prof. A. Bartkevičius. 2003–2006.

Theoretical Studies of Electron Spectra and Chemical Reactivity of Polyatomic Compounds. Habil. Dr. V. Gineitytė. 2005–2009.

Power Laws and 1/f Fluctuations in Dynamical Chaotic and Stochastic Systems. Prof. B. Kaulakys. 2005–2009.

Investigation of Ionisation in Gas Plasma with Condensed Particles by Mass Spectrometry Method. Prof. P. Serapinas. 2004–2008.

Projects, Programmes, Issues Supported by Lithuanian State Science and Studies Foundation

Lithuanian GRID: Parallel and Distributed Grid for Calculations. Habil. Dr. G. Tautvaišienė. 2006.

Integrative Computational Chemistry. COST Action D26. Dr. G. Vektaris. 2004–2006.

Prebiotic Chemistry and Early Evolution. COST Action D27. Dr. A. Tamulis. 2002–2007.

From Molecules to Molecular Devices: Control of Electronic, Photonic, Magnetic and Spintronic Behavior. COST Action D35. Dr. A. Tamulis. 2005–2010.

Physics of Risk. COST Action P10. Dr. V. Gontis. 2004–2007.

Integrative Computational Chemistry. Dr. V. Vektaris. 2004–2006.

Grid Computing in Chemistry (GRIDCHEM). COST Action D37. . Dr. A. Vektarienė. 2006–2010.

Fluctuation Spectroscopy of the New Generation of Nanometric Junctions and Two-dimension Electronic Gases (FLUCTUATIONS). Prof. B. Kaulakys. 2005–2006.

Investigation of Electrical Form Factors of Light Nuclei in the Model of Topological Solitons Dr. E. Norvaišas. 2006.

Damping of Gamov-Teller Resonance in gds Nuclei Dr. A. Juodagalvis. 2006.

International Science Programmes and Projects

FP6. Information Society Technologies. Integrated Project *Programmable Artificial Cell Evolution (PACE)*. Dr. A. Tamulis. 2004–2008.

FP6 project *Baltic Grid (Baltic Grid)*. Habil. Dr. G. Tautvaišienė. 2005–2008.

FP6 project *Baltic States Network "Women in Sciences and High Technology" (BASNET)*. Dr. A. Kupliauskienė. 2006–2007.

FP6 project *Astronomy Fair in Lithuania*. Dr. A. Kazlauskas. 2006.

Joint Research Project "Taiwan-Baltic Theoretical Studies of Spectroscopy of Atoms and Their Behavior in Strong Laser Fields". Habil. Dr. Z. Rudzikas. 2006–2007.

Alexander von Humboldt Foundation Research Cooperation. Partnership between Institutes: VU Institute of Theoretical Physics and Astronomy, and Kaiserslautern Technical University (Germany). Habil. Dr. G. Juzeliūnas. 2004–2007.

PHARE. Developing Reliable Infrastructure in the Fields of Measurements in Chemistry in Lithuania according to the Best EU Practices. Habil. Dr. P. Serapinas. 2004–2006.

Other Projects

Metrological Protocol for Standard Addition Method. Habil. Dr. P. Serapinas. 2004–2006.

The Whole Earth Telescope. Dr. R. Janulis, Dr. E. Pakštienė. Long-term international project.

The European Space Agency Satellite GAIA. Prof. V. Straižys, Habil. Dr. G. Tautvaišienė, Dr. A. Kazlauskas, Dr. A. Kučinskas. Long-term international project.

Structure and Evolution of RGB/AGB stars. Dr. A. Kučinskas. 2005–2006.

Projects Supported from EU Structural Funds

Training of the Capabilities of Lithuanian Scientists in the Integration of Lithuania into European Infrastructure. Dr. J. Ačaitė, Habil. Dr. G. Tautvaišienė. 2006–2008.

Science. Scientists. Society. V. Daniūnas. 2006–2008.

Development of Scientific Competence and Continuing Training for the Production of Safe and Ecological Food Stock. Prof. V. Pranskietis, Habil. Dr. P. Serapinas. 2005–2008.

MAIN PUBLICATIONS

Books

Third Annual Meeting COST action P10 & Workshop on Complex System Science, Program & Abstracts, Vilnius, 2006, 77 p. ISBN 9986-9332-6-9.

Sky of Lithuania 2007. Ed. G. Tautvaišienė. Vilnius, 2006, 188 p. (in Lithuanian). ISSN 1392-0987.

Articles

- A.Kupliauskienė, P.Bogdanovich, A.A.Borovik, O.Zatsarinny, A.N.Grzm-Grzhimailo, K.Bartschat. *The role of cascade processes in electron-impact excitation of the $(3p^5 4s^2 \ ^2P_{3/2,1/2})$ autoionizing levels in potassium* // J.Phys. B., **39**, No. 3, 591-601 (2006)
- G.Gaigalas, O.Scharf, S.Fritzsche. *Hyperfine structure parametrisation in Maple* // Comput. Phys. Commun., **174**, 202-221 (2006).
- A.Tamulis, V.Tamulis, A.Graja. *Quantum mechanical modeling of self-assembly and photoinduced electron transfer in PNA based artificial living organisms* // J. Nanoscience and Nanotechnology, **6**, 1-9 (2006).
- O.Scharf, G.Gaigalas. *Large scale multi-configuration Hartree-Fock calculations of hyperfine structure of the ground state of vanadium* // Central European Journal of Physics, **4**, 42-57 (2006).
- G.Seifert, J.Tamulienė, S.Gemming. *$Mo_n S_{2n+x}$ clusters-magic numbers and platelets* // Computational Material Science, **35**, 316-320 (2006).
- L.D.Finkelshtein, I.A.Nekrasov, A.B.Lyk'anov, E.Z.Kyrmaev, V.I.Anisimov, S.Kučas, A.Kynienė, J.-L.Wang, Z.Zeng. *The nature of elastic line in $L_{\alpha 3}$ -emission spectrum of X-rays in metallic manganese* // Fizika Tvyordovo Tela, **48**, No. 3, 398-402 (2006) (in Russian).
- S.Kučas, R.Karazija, A.Kynienė. *On the determination of natural width of levels for the open shell atoms with inner vacancy* // J.Phys. B: At. Mol. Opt. Phys., **39**, 1711-1719 (2006).
- G.Gaigalas, S.Fritzsche, E.Gaidamauskas, G.Kiršanskas, T.Žalandauskas. *JAHN - A program for representing atomic and nuclear states within an isospin basis* // Computer Physics Communications, **175**, 52-66 (2006).
- P.Bogdanovich, O.Rancova. *Quasirelativistic Hartree-Fock equations consistent with Breit-Pauli approach* // Phys. Rev. A, **74**, 052501(10) (2006).
- V.Jonauskas, P.Bogdanovich, P.Keenan, M.E.Foord, R.F.Heeter, S.J.Rose, G.J.Ferland, R.Kisielius, P.A.M. van Hoof, P.H.Norrington. *Energy levels and transition probabilities for boron-like FeXXII* // A&A, **455**, 1157-1160 (2006).
- R.Karazija, S.Kučas, A.Momkauskaitė. *Integral characteristics of spectra of ions important for EUV lithography* // J. Phys. D: Appl. Phys., **39**, No. 14, 2873-2978 (2006).
- G.Merkelis. *The effective operator for atomic level widths due to $I_1^{N1} I_2^{N2} - I_1^{N1+1} I_2^{N2-2} \epsilon_3$ Auger transitions*. Physica Scripta, **74**, 326-335 (2006)
- J.Tamulienė, M.L.Balevicius. *Search of sensitizer to peptide nucleic acid sequence with adenine and guanine bases* // Viva Origino, **34**, No. 3 (2006).
- P.Bogdanovich, D.Majus, T.Pakhomova. *Investigation of accuracy of configuration interaction for the oxygen isoelectronic sequence* // Physica Scripta, **74**, 558-562 (2006).
- C.Jordi, E.Høg, A.G.A.Brown, L.Lindgren, C. A. L.Bailer-Jones, J.M. Carrasco, J.Knude, V.Straizys, J. H. J. de Bruijne, J.-F.Claeskens, R. Drimmel, F.Figueras, M.Grenon, I.Kolka, M. A. C.Perryman, G. Tautvaišienė, V.Vansevicius, P. G.Willemsen, A.Bridžius, D.W.Evans, C.Fabircius, M.Fiorucci, U.Heiter, T.A.Kaempfer, A.Kazlauskas, A.Kucinskas, V.Malyuto, U.Munari, C.Reylé, J.Torra, A.Vallenari, K.Zdanavicius, R.Korakitis, O.Malkov, A.Smette. *The design and performance of the Gaia photometric system* // MNRAS, **367**, 290-314, 2006.

- N.Dolez, G.Vauclair, S. J.Kleinman, M.Chevreton, J.N.Fu, J.-E.Solheim, J.M.González Perez, A.Ulla, L.Fraga, A.Kanaan, M.Reed, S.Kawaler, M.S.O'Brien, T.S.Metcalfé, R.E.Nather, D.Sanwal, E.W.Klumpe, A.Mukadam, M.A.Wood, T.J.Ahrens, N.Silvestri, D.Sullivan, T.Sullivan, X.J.Jiang, D.W.Xu, B.N.Ashoka, E.Leibowitz, P.Ibbetson, E.Ofek, D.Kilkenny, E.G.Meištas, D.Alisaukas, R.Janulis, R.Kalytis, P.Moskalik, S.Zola, J.Krzesinski, W.Ogloza, G.Handler, R.Silvotti, S.Bernabei. Whole Earth telescope observations of the ZZ Ceti star HL Tau 76, *A&A*, **446**, 237-2 A.Kučinskas, P.H.Hauschildt, I.Brott, V.Vansevičius, L.Lindegren, T.Tanabé, F.Allard, *Broad-band photometric colors and effective temperature calibrations for late-type giants. II. $Z < 0.02$* // *A&A*, 452, 1021-, 2006.
- V.Ripepi, S.Bernabei, M.Marconi, F.Palla, A.Arellano Ferro, A.Bonanno, P.Ferrara, A.Frasca, X.J.Jiang, S.-L.Kim, S.Marinoni, G.Mignemi, M.J.P.F.G.Monteiro, T.D.Oswalt, P.Reegen, R.Janulis, E.Rodriguez, A.Rolland, A.Ruoppo, L.Terranegra, K.Zwintz, *A multisite photometric campaign on the pre-main-sequence δ Scuti pulsator IP Persei* // *ApJ*, **646**, 335-343, 2006.
- M.Vučković, S.D.Kawaler, S.O'Toole, Z.Csubry, A.Baran, S.Zola, P.Moskalik, E.W.Klumpe, R.Riddle, M.S.O'Brien, F.Mullally, M.A.Wood, V.Wilkat, A.-Y.Zhou, M.D.Reed, D.M.Terndrup, D.J.Sullivan, S.-L.Kim, W.P.Chen, C.-W.Chen, W.-S.Hsiao, K.Sanchawala, H.-T.Lee, X.J.Jiang, R.Janulis, M.Siwak, W.Ogloza, M.Paparó, Zs.Bognár, Á.Sódor, G.Handler, D.Lorenz, B.Steiningger, R.Silvotti, G.Vauclair, R.Oreiro, R.Østensen, A.Bronowska, B.G.Castanheira, S.O.Kepler, L.Fraga, H.L.Shipman, J.L.Provencal, D.Childers, *Whole Earth Telescope Observations of the Pulsating Subdwarf B Star PG 0014+067* // *ApJ*, **646**, 1230-1240, 2006.
- R.Silvotti, A.Bonanno, S.Bernabei, G.Fontaine, S.Charpinet, S.Leccia, H.Kjeldsen, R.Janulis, A.Frasca, R.Østensen, S.-L.Kim, B.-G.Park, X.Jiang, M.D.Reed, R.S.Patterson, K.M.Gietzen, P.J.Clark, G.W.Wolf, Y.Lipkin, L.Formiggini, E.Leibowitz, T.D.Oswalt, M.Rudkin, K.Johnston, P.Brassard, P.Chayer, E.M.Green, P.Bergeron, *The rapidly pulsating subdwarf B star PG 1325+101. I. Oscillation modes from multisite observations* // *A&A*, **459**, 557-564, 2006.
- S.Charpinet, R.Silvotti, A.Bonanno, G.Fontaine, P.Brassard, P.Chayer, E.M.Green, P.Bergeron, S.Bernabei, S.Leccia, H.Kjeldsen, R.Janulis, A.Frasca, R.Østensen, S.-L.Kim, B.-G.Park, X.Jiang, M.D.Reed, R.S.Patterson, K.M.Gietzen, P.J.Clark, G.W.Wolf, Y.Lipkin, L.Formiggini, E.Leibowitz, T.D.Oswalt, M.Rudkin, K.Johnston, *The rapidly pulsating subdwarf B star PG 1325+101. II. Structural parameters from asteroseismology* // *A&A*, **459**, 565-576, 2006.
- V.Straižys, R.Lazauskaitė, A.G.A.Brown, K.Zdanavičius, *Star Classification Possibilities with the Gaia Spectrophotometers. I. Simulated Spectra* // *Baltic Astronomy*, **15**, p. 449-459 (2006).
- V.Laugalys, V.Straižys, F.J.Vrba, R.P.Boyle, A.G.D.Philip, A.Kazlauskas, *CCD photometry and classification of stars in the North America and Pelican nebulae region. II. The region of NGC 6997* // *Baltic Astronomy*, **15**, 327-362, 2006.
- G.Tautvaišienė, G.Wallerstein, D.Geisler, G.Gonzalez, C.Charbonnel. *Chemical abundances in the Sagittarius Galaxy: Terzan 7* // *Highlights of Astronomy*, **12**, 210 (2005, nebuvo įtrauktas).
- A.Kučinskas, H.-G.Ludwig, P.H.Hauschildt, Convection and observable properties of late-type giants, in: "The Scientific Requirements For Extremely Large Telescopes", eds. P. Whitelock, B. Leibundgut, M. Dennefeld, *IAU Symp.* **232**, 498 (2006).
- A.Kučinskas, P.H.Hauschildt, H.-G.Ludwig, I.Brott, L.Lindegren, V.Vansevičius, T.Tanabé, F.Allard, *Photometric colors of late-type giants: theory versus observations*, in: "The Scientific Requirements For Extremely Large Telescopes", eds. P. Whitelock, B. Leibundgut, M. Dennefeld, *IAU Symp.* **232**, 276 (2006).
- G.Juzeliūnas, J.Ruseckas, P.Öhberg, and M.Fleischhauer. *Light-induced effective magnetic fields for ultracold atoms in planar geometries* // *Phys. Rev. A* **73**, 025602 (2006).

- G.Juzeliūnas. *Spontaneous emission in absorbing dielectrics: an alternative approach* // J. Phys. B: At. Mol. Opt. Phys. **39**(15), S627-S635 (2006).
- S.C.Skipsey, M.Al-Amri, M.Babiker, and G.Juzeliūnas. *Controllable spontaneous decay at material wedges* // Phys. Rev. A **73**, 011803(R).
- B.Kaulakys, J.Ruseckas, V.Gontis, and M.Alaburda, *Nonlinear stochastic models of 1/f noise and power-law distributions* // Physica A **365** (1), pp. 217-221 (2006).
- J.Ruseckas and B. Kaulakys. *Quantum trajectory method for the quantum Zeno and anti-Zeno effects* // Phys. Rev. A **73**, p. 052101 (2006).
- V.Gontis and B.Kaulakys. *Long-range memory model of trading activity and volatility* // J. Stat. Mech. (10) P10016 (2006).
- V.Gineitytė. *The suppressed reactivity of pyridine towards electrophiles as a result of an interplay between intra- and intermolecular interactions* // J. Mol. Struct.: THEOCHEM **760**(1-3), p. 229-234 (2006).
- V.Gineitytė. *The deconjugation effect in allyle ions under influence of an approaching reagent* // J. Mol. Struct.: THEOCHEM **766** (1), p. 19-24 (2006).
- V.Gineitytė. *Second-order effects in the Hückel model of perturbed alternant hydrocarbons and their coincidence for specific one- and two-center perturbations* // Int. J. Quant. Chem. **106** (9), p.2145 - 2160 (2006).
- A.Audzijonis, L.Žigas, R.Žaltauskas, J.Narušis, A.Pauliukas, and A. Čerskus. *Theoretical investigation of the electronic structure of ferroelectric SbSBr molecular cluster* // FERROELECTRICS **330**, p.25-35 (2006).
- A.Audzijonis, L.Žigas, J.Siroic, A.Pauliukas, R.Žaltauskas, A Čerskus, and J.Narušis. *Investigation of the electronic structure of the SbSeI cluster* // Physica Status Solidi B-Basic Solid State Physics **243**(3), p.610-617 (2006).
- J.Grigas, E.Talik, M.Adamiec, V.Lazauskas, V.Nelkinas. *XPS and electronic structure of quasi-one-dimensional BiSI crystals* // J. of Electron Spectroscopy and Related Phenomena, **153**, p.22-29 (2006).
- A.Vektariene, G.Vektaris. *Quantum chemical study of the thiiranium ion intermediates and regioselectivity features of the halogenide addition* // ARKIVOC Part(xvi) 23-34 (2006).
- A.Juodagalvis, I.Ragnarsson, and S.Åberg. *The Cranked Nilsson–Strutinsky versus the spherical shell model: A comparative study of the pf shell nuclei* // Phys. Rev. C **73**, 044327(13 p.) (2006).
- A.Acus, E.Norvaišas, and D.O.Riska. *The α particle as a canonically quantized multiskyrmion* // Phys. Rev. C, **74**, 025203(8 p.) (2006).
- P.Serapinas, J.Lubytė. *Low frequency noise in analytical soil measurements* // Accred. Qual. Assur. 2006, 11, 550-553.
- Laugalys V., Straižys V., Vrba F. J., Boyle R. P., Philip A. G. D., Kazlauskas A., *CCD photometry and classification of stars in the North America and Pelican nebulae region. III. The dark cloud L935* // Baltic Astronomy, **15**, No.4, 483-510 (2006).

Kazlauskas A., Straizys V., Bartašiūtė S., Laugalys V., Černis K., Boyle R. P., Philip A. G. D., *Zero-age main sequence in the Vilnius photometric system* // *Baltic Astronomy*, **15**, No. 4, 511-520 (2006).

A. Bartkevičius., J. Sperauskas. *High velocity spectroscopic binary orbits from photoelectric radial velocities. BD +30 2129 A.* // *Baltic Astronomy*, **15**, No. 4, 539-546 (2006).

A.Kupliauskienė, M.Šeimys, R.Valavičius. *Excitation of polarized atoms by fast electrons* // *Lithuanian J. Phys.*, **46**, 147-152 (2006).

P.Bogdanovich, O.Rancova. *Another form of quasi-relativistic Hartree-Fock equations* // *Lith. J. Phys.*, **46**, 153-162 (2006).

J.Tamulienė, A.Tamulis, A.Žiriakovienė, A.Graja. *Quantum mechanical design of two logical functions molecular device* // *Lith. J. Phys.*, **46**, 163-168 (2006).

P.Bogdanovich, R.Karpuškienė. *Influence of the two-electron transitions on the radiative lifetimes of excited levels in Be isoelectronic sequence* // *Lithuanian J. Phys.*, **45**, 347-352 (2005) (Instituto ataskaitose buvo 2005 m.).

P.Serapinas, Ž.Ežerinskis. *Multielement analytical spectrometry as data source for correlative classification of samples* // *Lith. J. Phys.*, **46**, 505-512 (2006).

A..Tamulis, V.Tamulis, H.Ziock, S.Rasmussen. *Influence of water and fatty acid molecules on quantum photoinduced electron tunnelling in photosynthetic systems of PNA based self-assembled protocells* // *Multi-scale Simulation Methods for Materials*, Eds. R.Ross and S.Mohantry, John Wille & Sons, Inc., New Jersey, 2006.

P.Bogdanovich. *Usage of Wybourne method for ab initio calculations of atomic spectra. Symmetry, Spectroscopy and SCHUR* // *Proceedings of the Professor Brian G. Wybourne Commemorative Meeting, Torun 12-14 June 2005*, Nicolaus Copernicus University Press, Torun, 33-38 (2006).

G.Tautvaišienė, B.Edvardsson, E.Puzeras, E.Stasiukaitis, I.Ilyin. *Chemical abundances and mixing in red clump stars of the Galaxy* // in *ESO–Arcetri Workshop on Chemical abundances and mixing in stars in the Milky Way and its satellites*, eds. S. Randich & L. Pasquini, ESO Astrophysics Symposia, Springer, 2006, 11-12.

G.Tautvaišienė, A.Ivanauskas, M.Grenon, I.Ilyin. *Elemental abundances in 10 dwarfs of the Galactic thick disk* //in *ESO–Arcetri Workshop on Chemical abundances and mixing in stars in the Milky Way and its satellites*, eds. S. Randich & L. Pasquini, ESO Astrophysics Symposia, Springer, 2006, 82-83.

K.Černis, J.Zdanavičius. *Astrometric observations of 214 asteroids (774 positions) and discovery of 5 new asteroids in Moletai Astronomical Observatory (Code 152)* // *M.P.C.* 56150 (2006).

K.Černis, J.Zdanavicius, H.Selevičius. *Astrometric observations of comets in Moletai Astronomical Observatory (Code 152)* // *M.P.C.* 56735 (2006).

K.Černis, H.Selevičius. *Astrometric observations of comets in Moletai Astronomical Observatory (Code 152)* // *M.P.C.* 56919 (2006).

K.Černis, J.Zdanavičius, H.Selevičius. *Astrometric observations of 61 asteroids (183 positions) in Moletai Astronomical Observatory (Code 152)* // *M.P.C.* 57112 (2006).

K.Černis, J.Zdanavičius, H.Selevičius. *Astrometric observations of 124 asteroids (295 positions) in Moletai Astronomical Observatory (Code 152) // M.P.C. 57575 (2006).*

K.Černis, J.Zdanavičius. *Astrometric observations of 312 asteroids (1600 positions) in Moletai Astronomical Observatory (Code 152) // M.P.C. 58050 (2006).*

K.Černis. *The discovery of the comet C/2006 A1 // IAU Circ. 8653 (2006).*

K.Černis. *The discovery of the comet C/2005 X4 // IAU Circ. 8672 (2006).*

K.Černis. *Orbital elements of the comet C/2005 X4 (2006) // M.P.E.C. 2006-C60.*

K.Černis, H.Selevičius, J.Zdanavičius. *Astrometric observations of the comet 73P-C (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-H26 (2006).*

K.Černis, H.Selevičius, J.Zdanavičius. *Astrometric observations of the comet 73P-G (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-H61 (2006).*

K.Černis, H.Selevičius, J.Zdanavičius. *Astrometric observations of comets: 73P-B, 73P-N, 73P-AQ (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-J10 (2006).*

K.Černis, H.Selevičius, J.Zdanavičius. *Astrometric observations of comets: 73P-C, 73P-C, 73P-R (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-J31 (2006).*

K.Černis, H.Selevičius, J.Zdanavičius. *Astrometric observations of comets: 73P-B, 73P-C, 73P-G, 73P-M, 73P-AQ (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-J54 (2006).*

K.Černis, H.Selevičius. *Astrometric observations of comets: 73P-B, 73P-C, 73P-G, 73P-R (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-K18 (2006).*

K.Černis, H.Selevičius. *Astrometric observations of the comet 73P-B (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-K55 (2006).*

K.Černis, H.Selevičius. *Astrometric observations of comets: 73P-B, 73P-C, 73P-AQ (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-L18 (2006).*

K.Černis, H.Selevičius. *Astrometric observations of comets: 73P-B (P/ Schwassmann-Wachmann 3) // M.P.E.C. 2006-L48 (2006).*

K.Černis, J.Zdanavičius. *Astrometric observations of comet 177P/Barnard // M.P.E.C. 2006-S50 (2006).*

K.Černis, J.Zdanavičius. *Discovery and astrometry of Aten group NEO asteroid 2006 SF77* // M.P.E.C. 2006-S57 (2006).

K.Černis, J.Zdanavičius.. *Astrometric observations of comet 4P/ Faye* // M.P.E.C. 2006-T45 (2006).

K.Černis. *Visual observations of comets 2P/Encke, 67P/ Churyumov–Gerasimenko, 72P Denning –Fujikawa* // International Comet Quarterly **28**, No.1, 18-26 (2006).

K.Černis. *Visual observations of comets C/1973 E1 (Kohoutek), C/1974 C1 (Bradfield) , C/1977 R1 (Kohler), C/1994 T1 (Machholz)* // International Comet Quarterly **28**, No.2, 58-69 (2006).

K.Černis. *Visual observations of comets C/2006 A1 (Pojmanski) and 73P-B, 73P-C, 73P-G (P/ Schwassmann-Wachmann 3)* // International Comet Quarterly **28**, No.3, 104-122 (2006).

B.Kaulakys, M.Alaburda, V.Gontis T. Meškauskas, *Multifractality of the multiplicative autoregressive point processes* // In *Complexus Mundi: Emergent Patterns in Nature*, Ed. M. M. Novak, World Scientific, Singapore, pp.277-286 (2006).

S.C.Skipsey, M.Babiker, M.Al-Amri G.Juzeliūnas, *Modeling quantum optical processes, interference, and correlations in novel microstructures* // Proceedings of SPIE. ISSN 0277-786X. Vol. 6328 (2006), p. 63280U (12 puslapių).

B.Kaulakys, M.Alaburda, V.Gontis, *Long-range stochastic point processes with the powerlaw statistics* // Prague Stochastics 2006, Proc. Prague Conf., 21-25 August 2006, Ed. M. Huskova and M. Janzura, Matfyzpress, Charles University in Prague, pp. 364-373 (2006).

V.Lazauskas, V.Nelkinas, J.Grigas, E.Talik, and V.Gavryushin. *Electronic Structure of Valence Band of Ferroelectric SbSI Crystals* // Lithuanian J. Phys. **46**, No2, p.205-210 (2006).

A.Vektarienė. *Ab-initio modeling of the addition reaction of methylsulphenchloride to functionalized ethenes* // Chemija **17**(2-3), 47-51 (2006).

D.Jurčiukonis and E. Norvaišas. *Quantum SU(3) Skyrme model for arbitrary representation* // Bulgarian Journal of Physics (ISSN:1310-0157, Heron press Ltd.) **33** (S2), 933 – 938 (2006).

COOPERATION

The foreign partners of the Institute are:

Vatican Observatory, Institute for Space Observations (USA)

Naval Observatory (USA)

National Central University (Taiwan)

Lund Observatory (Sweden)

National Astronomical Observatory (Japan)

University of Washington (USA)

Universidad de Concepción (Chile)

Geneva Observatory (Switzerland)

I'Observatoire Midi-Pyrénées, Toulouse (France)

Oulu University (Finland)

Uppsala Astronomical Observatory (Sweden)

In the frame of the WET Project, the Astronomical Observatory of the Institute cooperates with astronomical observatories in 15 countries. The partners in atomic, molecular and nuclear physics and quantum optics are from:

Queen's University Belfast (UK)

University of Strathclyde (UK)

Culham Science Centre (UK)

Institute of Metal Physics of RAS Ekaterinburg (Russia)

Institute of Electron Physics (Ukraine)

Saskatchewan University (Canada)

Kassel University (Germany)

Institute of Molecular Physics, Poznan (Poland)

University of East Anglia, Norwich (UK)

National Institute of Chemistry, Ljubljana (Slovenia) and other institutions

OTHER SCIENTIFIC ACTIVITIES

Prof. V. Straižys –

- editor-in-chief of the international scientific journal *Baltic Astronomy*.

Prof. R. Karazija, Prof. B. Kaulakys –

- editorial board members of the scientific journal *Lithuanian Journal of Physics*.

Dr. V. Gontis, Prof. B. Kaulakys, Prof. Z. Rudzikas –

- members of Science Council of Lithuania.

Prof. G. Gaigalas, Prof. R. Karazija –

- experts of Science Council of Lithuania.

Prof. A. Bartkevičius –

- expert of the Lithuanian State Science and Studies Foundation.

Prof. V. Straizys, Habil. Dr. G. Tautvaišienė, Dr. A. Kazlauskas, Dr. A. Kučinskas –

- members of working groups of the GAIA space mission, European Space Agency.

Habil. Dr. G. Tautvaišienė –

- member of the executive committee at the Commission of Stellar Atmospheres of the International Astronomical Union;
- member of the C19 (astrophysics) Commission of IUPAP.

Prof. Z. Rudzikas –

- President of the Lithuanian Academy of Sciences;
- member of executive committee of the European Physical Society;
- editor-in-chief of the scientific journal *Lithuanian Journal of Physics*;
- member of the Board of Governors of EU Joint Research Centre;
- member of the EU European Economic Social Committee.