

DEPARTMENT OF PHYSICS

<http://www.kf.elf.stuba.sk/>

Head of Department

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I. STAFF

Professors	Prof. Ing. Peter Ballo, PhD., Prof. Ing. Július Cirák, PhD., Prof. Ing. Rudolf Durný, DrSc., Prof. RNDr. Július Krempaský, DrSc.
Associate Professors	Doc. Ing. Peter Bokes, PhD., Doc. RNDr. Ivan Červeň, PhD., Doc. Ing. Peter Dieška, PhD., Doc. RNDr. Edmund Dobročka, PhD., Doc. RNDr. Peter Markoš, DrSc., Doc. Ing. Ján Vajda, PhD., Doc. RNDr. Pavol Valko, PhD.
Assistant Professors	Ing. Ondrej Foltin, PhD., RNDr. Juraj Chlpík, PhD., Mgr. Michal Kopčok, Ing. Tatiana Šrámková, RNDr. Mária Valková, Mgr. Marek Vančo, PhD., Ing. Ivan Zelenay, PhD.
Senior Scientist	Ing. Jozef Bielek, PhD.
Research Workers	Ing. Lubomír Keleši, Mgr. Martin Konôpka, PhD., Ing. Vlasta Macková, PhD., RNDr. Martin Moško, PhD., Ing. Michal Sokolský, Ing. Jaroslav Tóvik, PhD., Ing. Pavol Tomčík, Ing. Alfred Vlnieška, Ing. Martin Weis, PhD., Ing. Miroslava Zemanová-Diešková,
Technical Staff	Zuzana Váciová (secretary), Štefan Kučera
PhD. Students	Ing. Tomáš Váry

II. EQUIPMENT

II.1 Teaching and Research Laboratories

- Laboratories of elementary and advanced physics
- Laboratory of bioelectronics and organic electronics
- Laboratory of applied optics
- Laboratory of X-ray diffraction
- Laboratory of thermophysical properties
- Laboratory of macrostructure of composites
- Laboratory of material simulation
- Laboratory of spectroscopy
- Center for computational materials science

II.2 Special Measuring Instruments and Computers

- Refrigerator cooled cryostat NOK-10-3D
- Langmuir - Blodgett deposition device, Nima, UK
- Modular LB technology for deposition of organic layers
- Spectroscopic ellipsometer Horiba MM-16
- Measuring microscope CZJ
- Brewster angle microscope
- X-ray diffraction powder goniometer
- Numerical server with 16 nodes (128 cores) with infiniband

- 3 numerical servers (clusters) with 50 nodes (120 cores) - supporting infrastructure (incl. Myrinet)
- Sun storage tek 6140 FC maxperf
- 2 x Sun Fire server

III. TEACHING

III.1 Undergraduate Study (Bc.)

Subject, semester, hours per week for lectures and for seminars or practical exercises, name of lecturer.

Introduction to Technical Physics	(1st sem., 0-2h)	P. Ballo, P. Bokes, J. Cirák, P. Markoš, P. Valko
Physics	(2nd sem., 3-2h)	J. Cirák
Physics I	(2nd sem., 3-2h)	P. Ballo, P. Bokes, T. Šrámková
Special Seminar - Physics I	(2nd sem., 0-2h)	P. Ballo, P. Bokes
Physics	(2nd sem., 3-2h)	P. Valko
Special Seminar - Physics	(2nd sem., 0-2h)	P. Valko
Physics II	(2nd sem., 3-2h)	M. Vančo
Special Seminar - Physics II	(2nd sem., 0-2h)	M. Vančo
Physics	(3rd sem., 3-2h)	P. Valko
Special Seminar - Physics	(3rd sem., 0-2h)	P. Valko
Physics I	(3rd sem., 3-2h)	M. Vančo
Special Seminar - Physics I	(3rd sem., 0-2h)	M. Vančo
Physics II	(3rd sem., 3-2h)	J. Cirák, P. Markoš, T. Šrámková
Special Seminar - Physics II	(3rd sem., 0-2h)	J. Cirák, P. Markoš,
Physics III	(4th sem., 2-2h)	P. Valko
Modern Physics	(5th sem., 3-2h)	P. Markoš
Modern Methods of Material Diagnostics	(5th sem., 3-2h)	E. Dobročka
Modelling and Simulation	(5th sem., 2-3h)	P. Ballo
Thermodynamics of Materials and Statist. Physics	(6th sem., 3-2h)	M. Moško
Solid State Physics	(6th sem., 3-2h)	R. Durný

III.2 Graduate Study (Ing.)

Physics of Processes	(1st sem., 3-2h)	P. Bokes
Superconductivity and Low Temperature Physics	(1st sem., 2-2h)	P. Valko
Bioelectronics	(1st sem., 2-1h)	J. Cirák
Principles of Applied Optics	(1st sem., 2-2h)	J. Vajda

Non-equilibrium Systems and Chaos	(1st sem., 3-2h)	P. Ballo
Applied Optics	(2nd sem., 3-2h)	J. Vajda
Computer Physics	(2nd sem., 2-2h)	P. Markoš
Biomaterials and Biosystems	(2nd sem., 2-2h)	J. Cirák
Physics of Materials I	(3rd sem., 3-2h)	P. Dieška, R. Durný

IV. RESEARCH PROJECTS

- Integrated Education in Nanotechnology and Material Science. KEGA 3/637108 (P. Ballo)
- Gradient Materials Prepared by Powder Metallurgy of Micro- and Nano-particles. APVV-20-057805 (J. Bielek)
- Sound, Image and Biomedical Signals Digital Processing. 102/VTP/2000 (J. Bielek, P. Fuchs)
- Investigation of Magnetic Materials for Electrical Engineering, Electronics, Recording and Electromagnetic Compatibility Applications. VEGA 1/3096/06 (J. Bielek, J. Sláma)
- Controlling Spin Polarization in Nanostructures Using Electrical Currents. VEGA 1/0452/09 (P. Bokes)
- Transport Properties of Anchored Dithioazobenzene Switches. ETSF 220 (P. Bokes)
- National Centre for Research and Application of Renewable Energy Sources. Operational Program Research:
 - IMTS 26240120016 (J. Cirák, R. Durný)
 - IMTS 26240120028 (J. Cirák, R. Durný, P. Markoš)
- Nanostructures for Development of Biosensors. APVV-0362-07 (J. Cirák, R. Durný)
- Investigation of New Materials for Hybrid Electronics. VEGA 2/7118/27 (R. Durný)
- The Role of Water in Porous Structures. VEGA 2/0146/08 (P. Dieška)
- Thermo Physical Sensors. APVV-0497-07 (P. Dieška)
- Inelastic Transport of Electrons Through Nanojunctions with Phonons. VEGA 1/0632/10 (M. Konôpka)
- Electronic and Electromagnetic Waves in Small Systems: Transport properties. VEGA 0633/09 (P. Markoš)

V. COOPERATION

V.1 Cooperation in Slovakia

- Faculty of Chemical and Food Technology, STU, Bratislava
- Faculty of Informatics and Information Technologies, STU, Bratislava
- Faculty of Mechanical Engineering, STU, Bratislava
- Faculty of Material Technology, STU, Trnava
- International Laser Centre, Bratislava
- Natural Science Faculty, Comenius University, Bratislava
- School of Medicine, Comenius University, Bratislava
- Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava
- Faculty of Pharmacy, Comenius University, Bratislava
- Institute of Electrical Engineering, Slovak Academy of Sciences, Bratislava
- Institute of Informatics, Slovak Academy of Sciences, Bratislava
- Institute of Materials and Machine Mechanics, Slovak Academy of Sciences, Bratislava
- Institute of Physics, Slovak Academy of Sciences, Bratislava
- Institute of Polymers, Slovak Academy of Sciences, Bratislava
- University of Trnava, Trnava
- Technical University, FEI, Košice
- Electrotechnical Faculty, University of Žilina, Žilina

V.2 International Cooperation

- Tomáš Baťa University, Zlín, CzR
- Institute of Macromolecular Chemistry, AVČR, Prague, CzR
- Natural Science Faculty, Charles University, Prague, CzR
- University of West Bohemia, Plzeň, CzR
- Tokyo Institute of Technology, Tokyo, Japan
- Fukuoka University, Fukuoka, Japan
- King's College, London, UK
- University of York, UK
- Universitat Politècnica de Catalunya, Barcelona, Spain
- Centro de Física Nuclear, Lisbon, Portugal
- PTB Braunschweig, Germany
- Ruhr Universität, Bochum, Germany
- Delft University, Delft, The Netherlands
- Institute of Solid State Physics, Graz University of Technology, Graz, Austria
- Università di Modena e Reggio Emilia, Modena, Italy
- Ames Laboratory, Ames, Iowa, USA

V.3 Membership in International Organizations and Societies

- American Physical Society (J. Cirák)
- Europhysical Society (P. Ballo, P. Bokes, J. Cirák, I. Červeň, R. Durný, J. Krempaský, P. Markoš, P. Valko)
- IEEE (J. Cirák)
- The New York Academy of Sciences (J. Krempaský)
- Academia Scientiarum et Artium Europaea (J. Krempaský)
- Optical Society of America (P. Markoš)

VI. THESES**VI.1 Masters Thesis**

Masters thesis supervised by the member of the Department of Physics. The name of supervisor is in brackets.

- [1] Peterkeová, D.: Effect of Calcium Ions on Phospholipid Monolayers (J. Cirák)

VII. OTHER ACTIVITIES

- Organizing the 16th international conference - Applied Physics of Condensed Matter, APCOM 2010, Malá Lučivná, 16 – 18 June 2010 (P. Ballo, J. Vajda, M. Vančo, M. Weis)
- Organizing the 1st International scientific conference: Renewable energy sources. Tatranské Matliare, May 2010 (J. Cirák – conference chairman)
- Board of editors, Journal Electrical Engineering (P. Ballo)
- Beamline coordinator in European theoretical spectroscopy facility (P. Bokes)
- Club of physicists (J. Cirák)
- Board of editors, Horizons of mathematics, physics and computer sciences (I. Červeň)
- Board of editors, Beliana (I. Červeň)
- Member of Scientific Council of FEI STU (R. Durný)
- Organizing the conference - Open source software in education, research and IT solutions. 1 – 4 June 2010, University of Žilina. (T. Šrámková)

VIII. PUBLICATIONS**VIII.1 Journals**

- [1] BOKES, P. - HORVÁTH, F.: Edge-Induced Spin Polarization in Two-Dimensional Electron Gas. In: Physical Review B. - ISSN 1098-0121. - Vol. 81, Iss. 18 (2010), Art.no. 125302. (in English)
- [2] CHLPÍK, J. - DRŽÍK, M. - KOLEDA, M.: Time Resolved Photothermal Deflection Measurement of Semiconductor Materials Thermal Parameters. In: Acta Electrotechnica et Informatica. - ISSN 1335-8243. - Vol. 10, No. 3 (2010), p. 86-89. (in English)
- [3] CIRÁK, J.: Self-Organization in Two-Dimensional Organic Molecular Systems (Applications in Biomembranes). In: The Open Macromolecules Journal. - Vol. 4 (2010), p. 48-52. (in English)
- [4] ČERVEŇ, I.: Notes to the Energy Band Term in Semiconductors. In: EE časopis pre elektrotechniku a energetiku. - ISSN 1335-2547. - Vol. 16, No. 1 (2010), p. 22. (in Slovak)
- [5] KREMPASKÝ, J. - KLUVÁNEK, P.: Universality of Lorenz System of Equations. In: Acta Facultatis Paedagogicae Universitatis Tyrnaviensis. - Ser. C, No. 13 (2010), p. 53-57. (in English)
- [6] MARKOŠ, P.: Absence of Diffusion in Certain Random Lattices: Numerical Evidence. In: Acta Physica Universitatis Comenianae. - ISSN 0231-889X. - Vol. 50-51 (2010), p. 45-52. (in English)
- [7] MARKOŠ, P.: Electron Transport in Strongly Disordered Structures. In: Physica B-Condensed Matter. - ISSN 0921-4526. - Vol. 405 (2010), p. 3029-3032. (in English)
- [8] MARKOŠ, P. - SCHWEITZER, L.: Logarithmic Scaling of Lyapunov Exponents in Disordered Chiral Two-Dimensional Lattices. In: Physical Review B. - ISSN 1098-0121. - Vol. 81, Iss. 18 (2010), Art. no. 205432. (in English)
- [9] MARKOŠ, P. - SCHWEITZER, L.: Role of the Symmetry Parameter Beta in the Strongly Localized Regime. In: Physical Review B. - ISSN 1098-0121. - Vol. 82 (2010), Art. no. 113412. (in English)
- [10] MARKOŠ, P.: Two-Dimensional Electron Systems beyond the Diffusive Regime. In: Physical Review B. - ISSN 1098-0121. - Vol. 82 (2010), Art.No. 094203. (in English)
- [11] SEBESTYÉN, K. - MARKOŠ, P.: Acceleration of Numerical Simulations with the Use of Graphic Card. In: Posterus.sk. - ISSN 1338-0087. - July (2010), <http://www.posterus.sk/?p=7900>. (in Slovak)
- [12] SOKOLSKÝ, M. - CIRÁK, J.: Dye-Sensitized Solar Cells: Materials and Processes. In: Acta Electrotechnica et Informatica. - ISSN 1335-8243. - Vol. 10, No. 3 (2010), p. 78-81. (in English)
- [13] SOKOLSKÝ, M. - CIRÁK, J.: Operating Principle of Solar Cell Based on Photosensitized Dye. In: EE časopis pre elektrotechniku a energetiku. - ISSN 1335-2547. - Vol. 16. No. 4 (2010), p. 8-10. (in Slovak)
- [14] STANČÍK, S. - FRIC, R. - PAULECH, J. - KUTIŠ, V. - MURÍN, J. - CIRÁK, J.: Electro-Thermal and Fluidized-Thermal Analysis of the Rope Coupling Temperature Rise. In: Energetika. - ISSN 0375-8842. - Vol. 60 (2010), p. 569-572. (in Slovak)
- [15] ŠÁLY, V. - PACKA, J. - RUŽINSKÝ, M. - PERNÝ, M. - KUSKO, M. - DURNÝ, R.: Activities in Area of Photovoltaics at FEI STU in Bratislava. In: EE časopis pre elektrotechniku a energetiku. - ISSN 1335-2547. - Vol. 16. No. 4 (2010), p. 10-11, 24. (in Slovak)

- [16] TURANSKÝ, R. - KONÔPKA, M. - DOLTSINIS, N.L. - ŠTICH, I. - MARX, D.: Optical, Mechanical, and Opto-Mechanical Switching of Anchored Dithioazobenzene Bridges. In: ChemPhysChem. - ISSN 1439-4235. - Vol. 11 (2010), p. 345-348. (in English)
- [17] TURANSKÝ, R. - KONÔPKA, M. - DOLTSINIS, N.L. - ŠTICH, I. - MARX, D.: Switching of Functionalized Azobenzene Suspended between Gold Tips by Mechanochemical, Photochemical, and Opto-Mechanical Means. In: Physical Chemistry Chemical Physics. - ISSN 1463-9076. - Vol. 12, Iss. 42 (2010), p. 13922-13932. (in English)
- [18] VÁRY, T. - MARKOŠ, P.: Propagation of Surface Plasmon Polaritons through Gradient Index and Periodic Structures. In: Opto-Electronics Review. - ISSN 1230-3402. - Vol. 18, No. 4 (2010), p. 400-407. (in English)
- [19] VÁRY, T. - MARKOŠ, P.: Scattering of the Surface Plasmon Polaritons on the Interface between Two Dielectrics. In: Physica B-Condensed Matter. - ISSN 0921-4526. - Vol. 405 (2010), p. 2982-2985. (in English)

VIII.2 Conference Proceedings

- [1] BALLO, P. - HARMATHA, L. - VITKOVSKÁ, E.: Introduction to Computational Physics and Supercomputing. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 16-19. (in English)
- [2] CIRÁK, J. - SOKOLSKÝ, M.: Visualization of Domains in 2D Molecular Systems by Brewster Angle Microscope. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 199-203. (in English)
- [3] DIEŠKOVÁ, M. - BOKES, P.: Conduction of Tunnel Junctions from Simple Models and First Principles. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 96-99. (in English)
- [4] DOUGLAS, A. - MARKOŠ, P. - MUTTALIB, K.A.: Distribution of Conductance for Anderson Insulators: A Theory with a Single Parameter. In: Bulletin of the American Physical Society: March Meeting 2010. Portland, USA, 15.-19.3.2010. - Austin: American Physical Society, 2010. - V38.00004. (in English)
- [5] DURNÝ, R. - NÁDAŽDY, V. - PLECENÍK, A. - ZEMAN, M.: Staebler-Wronski Effect in Thin Silicon Films Deposited from Hydrogen Diluted Silane. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 301-304. (in English)
- [6] FEREC, T. - TÓBIK, J.: Wimshurst Machine. In: ŠVOČ 2010: Proceedings of Selected Works. - Bratislava: FEI STU, 2010. - ISBN 978-80-227-3286-4. - CD-Rom. (in English)
- [7] JAKABOVIČ, J. - KOVÁČ, J. - SRNÁNEK, R. - WEIS, M. - SOKOLSKÝ, M. - HINDERHOFER, A. - BROCH, K. - SCHREIBER, F. - DONOVAL, D. - CIRÁK, J.: Pentacene-Gate Dielectric Interface Modification with Silicon Nanoparticles. In: IVC - 18th International Vacuum Congress: Beijing, China, 23.-27.8.2010. - Beijing: Chinese Vacuum Society, 2010. (in English)
- [8] KÁDÁR, O. - UHEREK, F. - CHLPÍK, J. - REMSA, J. - BRUNCKO, J. - VINCZE, A. - JELÍNEK, M.: Characterization and Optical Properties of TiO₂ Prepared by Pulsed Laser Deposition. In: ASDAM 2010. 8th International Conference on Advanced Semiconductor Devices and Microsystems: Smolenice Castle, Slovak Republic. 25.-27.10.2010. - Piscataway: IEEE, 2010. - ISBN 978-1-4244-8572-7. (in English)

- [9] KÁDÁR, O. - UHEREK, F. - CHLPÍK, J. - BRUNCKO, J. - FLICKYNGEROVÁ, S. - LUPTÁK, R. - CHO VAN, J.: Investigation of Optical Properties of ZnO Prepared by Pulse Laser Deposition and Sputtering. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 76-79. (in English)
- [10] KÁDÁR, O. - UHEREK, F. - CHLPÍK, J. - BRUNCKO, J. - FLICKYNGEROVÁ, S. - LUPTÁK, R. - CHO VAN, J.: ZnO as a Material for Integrated Photonics. In: ELITECH'10: 12th Conference of Doctoral Students. Bratislava, Slovak Republic, 26.5.2010. - Bratislava: FEI STU, 2010. - ISBN 978-80-227-3303-8. - CD-Rom. (in English)
- [11] KONÔPKA, M. - BOKES, P.: Simulation of Time-Dependent Currents in Resonant Nanojunction. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 36-39. (in English)
- [12] KREMPASKÝ, J.: Ethical Principles in Nature. In: Physics and Ethics IV. Science, Man, Nature – Activities, Dilemmas, Risks. Proceedings of Monographic Studies of Conference with International Participation. Nitra, Slovak Republic, 29.-30.6.2009. - Nitra: Constantine the Philosopher University, 2010. - ISBN 978-80-8094-700-2. - p. 79-89. (in Slovak)
- [13] MIKOLÁŠEK, M. - HARMATHA, L. - GAŠPIERIK, P. - BALLO, P.: Research and Development in the Area of Advantage Silicon Solar Cell Technologies. In: Power Engineering 2010. Renewable Energy Sources: 1st International Scientific Conference. Tatranské Matliare, Slovak Republic, 18.-20.5.2010. - Bratislava: STU, 2010. - ISBN 978-80-89402-24-3, CD-Rom. (in English)
- [14] MIKOLÁŠEK, M. - RACKO, J. - GAŠPIERIK, P. - HARMATHA, L. - BALLO, P. - ŠUTTA, P.: The Influence of the TCO/Emitter Schottky Barrier on the Performance of a-Si:H(n)/c-Si(p) Hetero-Structure Solar Cells. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 44-47. (in English)
- [15] RUDOLF, M. - MARKOŠ, P.: Surface Waves. In: ŠVOČ 2010: Proceedings of Selected Works. - Bratislava: FEI STU, 2010. - ISBN 978-80-227-3286-4. - CD-Rom. (in Slovak)
- [16] SEBESTYÉN, K. - MARKOŠ, P.: Acceleration of Numerical Simulations with the Use of Graphic Card. In: ŠVOČ 2010: Proceedings of Selected Works. - Bratislava: FEI STU, 2010. - ISBN 978-80-227-3286-4. - CD-Rom. (in Slovak)
- [17] SKORŠEPOVÁ, T. - CHLPÍK, J. - MARKOŠ, P.: Surface Electromagnetic Waves. In: ŠVOČ 2010: Proceedings of Selected Works. - Bratislava: FEI STU, 2010. - ISBN 978-80-227-3286-4. - CD-Rom. (in Slovak)
- [18] SOKOLSKÝ, M.: Operation Principles of Dye-Sensitized Solar Cells. In: Power Engineering 2010. Renewable Energy Sources: 1st International Scientific Conference. Tatranské Matliare, Slovak Republic, 18.-20.5.2010. - Bratislava: STU, 2010. - ISBN 978-80-89402-24-3, p. 41-42. (in English)
- [19] VÁRY, T. - MARKOŠ, P.: Propagation of the Surface Plasmon Polaritons through Periodic Structures. In: APCOM 2010. Applied Physics of Condensed Matter: 16th International Conference. Malá Lučivná, Slovak Republic, 16.-18.6.2010. - Bratislava: STU, 2010. - ISBN 978-80-227-3307-6. - p. 84-87. (in English)

- [20] VITKOVSKÁ, E. - BALLO, P.: Solid State Ab Initio Calculations. In: ŠVOČ 2010: Proceedings of Selected Works. - Bratislava: FEI STU, 2010. - ISBN 978-80-227-3286-4. - CD-Rom. (in Slovak)

VIII.3 Books

- [1] ČERVEŇ, I.: Handbook of Physical Terms and Relations. - Bratislava: STU, 2010. - 151 p. - ISBN 978-80-227-3201-7. (in Slovak)
- [2] KOPČAJ, A. - KREMPASKÝ, J. - POLAKOVIČ, L. - BONČEK, R.: Management and Complexity. - Ostrava: VŠB - TU, 2010. - 68 p. - ISBN 978-80-248-2323-2. (in Slovak)