DEPARTMENT OF PHYSICS

1. General Information

The Department of Physics teaches General Physics to students of all faculties of the University and Advanced Physics for some special courses. The Department provides the students with the basic understanding of physics, training them in applying the principles of physics to various engineering problems as well as giving the students a review of modern physics.

The department is divided into three sections according to their research and educational specialisation and an additional one, which has special tasks to support the research activities of the Department. The staff consists of 1 professor, 8 associate professors, 13 senior lecturers, 3 lecturers, 3 research fellows, 9 technicians and administrative support.

Traditionally, the research carried out at the department is mostly concerned with the utilization of ultrasonic methods for the investigation of condensed matter. Currently a wide range of ultrasonic techniques is used to investigate semiconductors, metals and ferroelectric materials as well as new ultrasonic techniques are developed. The Department also contains one group working on optical fibres, which are used in communication links, and some research work has been done on the x-ray diffraction analysis of thin layers. In last years the research programme was extended to theoretical high-energy physics phenomenology of strong electroweak symmetry breaking.

The research groups of the Department are also well known abroad. The scientific activities of the Department are regularly presented at the international conferences and are published in significant physical journals.

In accordance with their qualifications the members of the staff participate in different educational, scientific and management activities beyond the framework of the department and the University, especially on various scientific boards of both domestic and international institutions. There are also many activities directed to advancing the education of physics teachers working in secondary schools and to the organisation of Physics Olympiads in order to prepare young people for national and international competitions.

2. Staff of the Department

Head of the Department	:	Igor Jamnický, Assoc. Prof. PhD.
Subhead of the Department	:	Peter Bury, Prof., PhD.
Secretary for Education	:	Ctibor Musil,PhD.
Administrative support	:	Anna Chasníková, Naďa Remencová, Juraj Remenec, Viliam Tavač,

2.1. Sections of the Department:

2.1.1 Section of General Physics

Head of the section	:	Juraj Braciník
Associate professors	:	Juraj Braciník,
Research fellows	:	Mikuláš Gintner, Ivan Melo
Senior lecturers	:	Anna Braciníková, Ján Demko, Milan Krkoška, Ivan Pavlus,Terézia Štrbová, Igor Varga, Pavol Virdzek
Lecturers	:	Vladimír Žucha, Gabriela Tarjányiová

2.1.2.Section of Acoustics

Head of the section	:	Drahoslav Vajda
Professor	:	Peter Bury
Associate professors	:	Igor Jamnický, Sofia Slabeyciusová Jozef Kejst, Drahoslav Vajda

Senior lecturers	:	Ivan Bellan. Peter Hockicko, Jozef Štelina, Ladislav Vikisály, Dušan Pudiš
Lecturers	:	Andrea Hanuliaková

2.1.3. Section of Applied Physics

Head of the section	:	Ivan Turek
Associate professors	:	Ivan Turek, Quido Jackuliak, Július Štelina
Senior lecturers	:	Ctibor Musil, Karol Grondžák, Ivan Martinček, Beáta Trpišová

:

2.1.4. Section for Research Activities Support

Head of the section	:	Jaroslav Kovár
Research fellows	:	Ján Vančo (1/2)
Technical staff	:	František Černobila, Elena Pechancová, Ján Gažo (1/2), Milan Obrcian, ĽudovítTrháč

2.1.5. Postgraduate Students

	:	Ivan Bellan, Peter Hockicko, Norbert Tarjanyi, Gabriela Tarjányiová, Pavol Virdzek, Vladimír Žucha

3. Teaching
3.1. Courses in Bachelor and Master Degree Programmes

Code	Tittle	Semester	Lessons-Seminars-Lab.exercises hours/week	Teachers
Courses for the Faculty of Electrical Engineering				
31070	Physics I	2	3 - 2 -1	Bury, Jamnický
31047	Physics II	3	4 - 1 - 1	Bury, Jamnický
31059	Semiconductor Physics	4	4 - 0 - 0	Braciník
31101	Introduction to Physics	1	2 - 0 - 0	Krkoška
31023	Computer Modelling of the Real Processes	3	1 - 0 - 2	Jamnický
31080	Introduction to Physics II	3	0 - 2 - 0	Braciník, Jamnický
31081	Seminar on Semiconductors	4	0 - 2 - 0	Pudiš
32236	Optoelectronics	5	2 - 0 - 2	Štelina
31688	Principles of Modern Acoustics	7	3 - 1 - 0	Vajda
32201	Physics	1	3 - 2 - 1	Musil
31007	Analysis of Quantities and Processes	2	0 - 2 - 0	Pavlus
31099	Wave processes	4	2 - 2 - 0	Čáp
32008	Seminar on Physics	1	0 - 2 - 0	Štrbová
32002	Electrophysics	1	3 – 2 - 1	Musil
Courses of the Faculty of Mechanical Engineering				
21950	Introduction to Physics	1	1 - 1 - 0	Jackuliak
21008	Physics I	2	3 - 2 - 0	Vajda, Slabeyciusová, Jackuliak
21013	Physics II	3	2 - 0 - 2	Vajda, Jackuliak
22002	Technical Physics	2	2 - 2 - 0	Vikisály

26011	Physics II	3	24 - 6 - 0	Jackuliak

Courses of the Faculty of Civil Engineering

41031	Introduction to Physics II	2	0 - 2 - 0	Kovár
41011	Physics II	2	2 - 1 - 1	Štelina
42351	Introduction to physics	1	0 - 2 - 0	Štelina,Hockicko
42303	Physics - optics	1	2 - 2 - 0	Štelina
42804	Physics – optics	2	2 - 1 - 0	Štelina

EXTERNAL STUDY

46095	Physics I.	1	10 – 6 – 0	Krkoška
46008	Physics II.	2	10 – 6 – 0	Krkoška

Courses of the Faculty of Operation and Economics of Transport and Communication

11010	Physics	2	3 - 1 – 2	Martinček,Pavlus, Kejst

External Study

			hours/sem.	
16032	Physics I	2	24 - 4 - 0	Bury

Courses of the Faculty of Management Science and Informatics

P403	Fundamentals of physics	3	3 - 1 - 1	Braciník, Pavlus, Vikisály
P311	Physics I	1	4 - 1 - 1	Kejst
P412	Physics II	4	4 - 1 - 1	Kejst

Courses of the Faculty of Special Engineering

			hours/sem	
66323	Physics	1	2 - 1 –14	Kovár

Courses of the Faculty of Natural Sciences

61058	General Physics IV	4	3 – 2 - 0	Melo
81089	Theoretical Mechanics	4	2 – 0 – 0	Braciník
81089	Theoretical Mechanics	3	1 – 1 – 0	Braciník

4. Research Projects

4.1. Internal Projects

Title: Investigation of Nonlinear Optical and Acoustooptical Phenomena in selected Materials (Ef-A-023/00)

Coordinator: Július Štelina
Cooperators: Juraj Braciník, Ivo Čáp, (DAS – FS), Klára Čápová (DTAE), Dagmar Faktorová (DTAE), Karol Grondžák, Jozef Kejst, Quido Jackuliak, Ctibor Musil, Norbert Tarjanyi, Ivan Turek

Title: To find new methods of measurement of optical fiber parameters

Coordinator: Ivan Turek
Cooperator: Ivan Martinček, Karol Grondžák

Title: Study of Physical Properties of Materials Perspective for Electrotechnics Using Acoustic Methods

Coordinator: Peter Bury
Cooperators: Drahoslav Vajda, Igor Jamnický, Peter Hockicko, Jaroslav Kovár, Ivan Bellan

Title: Study of electroweak symmetry breaking

Coordinator: Ivan Melo
Cooperator: Mikuláš Gintner

Title: Study of Physical Properties of Materials Using Wave Processes

Coordinator: Sofia Slabeyciusová
Cooperators: Ivan Turek, Igor Jamnický, Karol Grondžák, Milan Krkoška, Ivan Pavlus

4.2. Research Projects funded by the Science & Education Grant Agency of the Slovak Republic

Title: Phenomenological Studies of the Role of the Top Quark in the Strong Electroweak Symmetry Breaking (Grant VEGA 1/8307/01)

Coordinator: Mikuláš Gintner
Cooperator: Ivan Melo

Title: Study of Physical Properties of Prospective Materials Using Acoustic Methods (Grant VEGA 1/8308/01)

Coordinator: Peter Bury
Cooperators: Igor Jamnický, Peter Hockicko

Title: Examination of Self – Diffraction in Magnetic Fluids. (Project is a part of the programme: Study of Physical Parameters of Complex Systems with Fine Magnetic Particles)

Coordinator: Ivan Turek
Cooperators: Július Štelina, Ctibor Musil

4.3 International Projects

Title: Measurement Technique for Active and Passive Fibres to Support Future Telecommunication Standardisation (COST-265)

Coordinator: Milan Dado (DT)
Cooperators: Ivan Turek, Karol Grondžák, Ivan Martinček

5. Cooperation

5.1. Cooperation in Slovakia:

- Department of Physics, Faculty of Electrical Engineering and Information Technology , Slovak University of Technology in Bratislava
- Departments of Faculty of Mathematics, Physics and Informatics, Comenius University in Bratislava
- Department of Physical Engineering, Faculty of Industrial Technology, Trenčin University, Púchov
- Department of Physics, Military Academy, Liptovský Mikuláš
- ATLAS group, Institute of Experimental Physics, Slovak Academy of Science, Košice,
- Virtual Collaboration, University of P.J. Šafarik, Košice
- Institute of Experimental Physics , Slovak Academy of Science, Košice,
- Volkswagen Slovakia, Bratislava
- Welding Research Institute, Bratislava

5.2. International cooperation

- Institute of Biochemical Physics, RAS, Moscow
- Škoda – Research, Prague
- Department of Physics, Nottingham University
- ÚRE Prague
- Institute of Experimental Physics Science, Czech Academy, Prague
- Columbia University , New York
- ATLAS collaboratio, CERN, Switzerland

5.2.1. Visits to Foreign Institutions:

- Ivan Melo - Vienna University, Austria, 2 days, Cern, Geneva - 9 days,
- Mikuláš Gintner - Vienna University, Austria, 2 days, Cern, Geneva - 9 days,

6. Other activities

6.1 Special Lectures, Seminars provided by the Department

[1] RNDr. I. Melo, PhD. : „Strong EWSB in e+e- -> nu nu tt" at Triangle Meeting Seminar, University of Vienna, Austria, 29.-30.11.2002

[2] J. Štelina, C. Musil: "An explanation of light diffraction on diffraction grating", contributed to pedagogical conference „Fyzikálny festival 2002", Smolenice, Slovakia, 16.-17.9. 2002.

[3] C. Musil, J. Štelina "Experiments in light polarization and their interpretation", contributed to pedagogical conference „Fyzikálny festival 2002", Smolenice, Slovakia, 16.-17.9. 2002.
[4] RNDr. I. Melo, PhD. : „Elementary course in elementary particles", Gymnázium Veľká Okružná Žilina, 7.1. 2002
[5] J. Štelina, C. Musil: Demonstrations for high-school students in optics, Gymnázium Veľká Okružná,12.2. 2002.
[6] J. Štelina, C. Musil: Demonstrations for high-school students in optics, Gymnázium Veľká Okružná, 9.7. 2002.
[7] Doc. RNDr. Dušan Bruncko, CSc. : "Physics Potential of ATLAS detector", KF ŽU, 17.1. 2002.
[8] RNDr. I. Melo, PhD. : „Strong Electroweak Symmetry Breaking in e+e- -> nu nu tt", KF ŽU, 29.10. 2002.
[9] Ing. Dušan Pudiš, PhD. : „New trends in optoelectronic elements – quantum structures", KF ŽU, 21. 11. 2002.
[10] Doc. RNDr. Quido Jackuliak, CSc. : „X-ray methods and Investigation of Structural Properties of Thin Layers", KF ŽU, 26. 11. 2002.
[11] Doc. RNDr. Ivan Turek, CSc. : „Alternative Imaging of Small Objects", KF ŽU, 17. 12. 2002.
[12] Small seminars are organized by acoustic (Doc. Vajda) and optical (Doc.Turek) groups.
[13] Computer and software seminars (server, Linux – M. Gintner)
[14] Computer and software seminars (LaTeX – V. Žucha)

7. Publications

Textbooks:

[1] Quido Jackuliak and Collaborators (Collaborators: I. Baják, D. Vajda, P. Hockicko): Zbierka úloh z fyziky I (Collection of Physics 1 Problems). Published by Žilinská univerzita v Žiline, 2002.
[2] Dept. of Physics STU, Dept. of Physics ŽU (J. Braciník, I. Jamnický): Electronic Lecture Notes – Physics I., (http://kf-lin.elf.stuba.sk/~ballo/e3/)

Journals:

[3] Turek, J. Štelina, C. Musil, P. Kopčanský, M. Timko, M. Konarecká, I.Potočová, A. Juríková, L. Tomčo, Self-difraction of the light in magnetic fluids, Czechoslovak Journal of Physics 52 (2002), Suppl. A, p. 273-276.
[4] Norbert Tarjányi, Ivan Turek, Odhad koncentrácie donorov v LiNbO3 na základe fotorefraktívneho javu (An estimation of donor concentration in v LiNbO3 using the photorefraction phenomenon) , Advances in Electrical and Electronic Engineering, 1 (2002), 48.
[5] Daniel Káčik, Ivan Turek, Ivan Martinček, Drahomír Grendár, Interferencia vidov ako zdroj informácií o optických vláknach, (Intermodal interference as a source of information about optical fibres) , Advances in Electrical and Electronic Engineering, 1 (2002), 43
[6] Daniel Káčik, Ivan Turek, The applicability of transversal off-set method for determination of mode field diameter, Jemná mechanika a optika, 8/2002, p.224.
[7] Turek, I. Martinček, D.Káčik, P.Peterka, Intermodal Interference as a Tool for Optical Fibres Diagnostic, Invited contribution for Research Signpost Publishing, (Trivandrum,

Kerala, India) for the book „Recent Research Developments in Optical Engineering“ (to be published in Mar 2003).

[8] Ivan Turek, Význam matematiky a fyziky pre spoločnosť (The impact of Mathematics and Physics on society), lecture at the Meeting of Slovak mathematicians and physicists, Nitra 2002, published as „Vzdelanie je to čo zostane keď všetko zabudneme“ (The education is what remains when all is forgotten) in journal Pedagogické spektrum, 7/8 2002, p.1. and accepted for publication in Obzory matematiky fyziky a informatiky.

[9] Melo I., Grondžák K. and members of the Virtual Collaboration.VRVS(Virtual Room Videoconferencing System): *Deployment of VRVS technology in Slovakia*. Systémová integrácia. Fakulta riadenia a informatiky, ISSN 1335-4191

[10] D. Vajda, A. B. Sherman, *Attenuation of Ultrasonics wave in y-direction with the fluctuation in KH_2PO_4 crystals above and below Curie Temperature*, Práce a štúdie Žilinskej univerzity, séria elektrotechnická, č. 28, 2002, p. 77-81

[11] J. Braciník, J. Kejst: *Acoustic Technique for Study of the Surface Nonequilibrium Processes in Piezoelectric Semiconductors*, Acta Acustica, accepted for publication Nov. 10, 2002.

[12] Turek, I.Čáp, Budúcnosť začína dnes (The future begins today), Spravodajca žilinskej univerzity, 4 (2002), p.1., also published in student journal ŽUŽO .

[13] Beloslav Riečan. Ivan Turek, Jednota slovenských matematikov a fyzikov (About The Society of Slovak Mathematicians and Physicists), published in journal Spravodaj Rady slovenských vedeckých spoločností, SAV, 1-2 (2002), p.3

Proceedings:

[14] Norbert Tarjányi, Ivan Turek, Vyšetrovanie záznamu optického poľa vytvoreného prostredníctvom fotorefraktívneho javu v LiNbO3:Fe (A study of photerefractive record of an optical field in LiNbO3:Fe), Proceedings of the 14 th Conference of Czech and a Slovak Physcists, Plzeň, Sep 2002, p.479.

[15] D. Bruncko, I. Melo a M. Gintner, *Strong EWSB in e+e- -> nu nu tt*, Contribution to the Proceedings of the conference Hadron Structure 2002, Herľany, 22. – 26. 9. 2002 (will be published)

[16] P. Šutta, Q. Jackuliak, *Microstructure of Indium-Tin-Oxide Films Deposited on Glass Substrates*, Contribution to the Proceedings of the conference ASDAM'02, Smolenice, 14.-16. 10. 2002, p. 137.

[17] P. Šutta, Q. Jackuliak, *Lattice and Micro-strains in Polycrystalline Silicon Films Deposited on Ceramic Substrates*, Contribution to the Proceedings of the conference ICTF 12, Bratislava, 15.-20.9. 2002, p. 181.

[18] D. Bruncko, I. Melo a M. Gintner, *Strong EWSB in e+e- -> nu nu tt*, Contribution to the Proceedings of the conference Small Triangle Meeting 2002, Snina, 8.-10. 10. 2002 (will be published)

[19] Dirner, U. Babiakova, A. Bílová, D. Blažek, D. Bruncko, M. Bulla, J. Demko, M. Domarácký, F. Franko, M. Ganaj, **M. Gintner**, **K. Grondžák**, J. Hlaváčová, R. Kalakay, M. Kireš, I. Kišíková, G. Petráš, V. Koubek, I. Lokšová, G. Martinská, M. Marušak, M. Mochnay, **I. Melo**, P. Murín, M. Murínová, J. Pieronová, A. Nogová, J. Pišút, M. Šerý, L. Štrbianová, A. Šurda, S. Tokár, S. Uličiansky, E. Vojtelová, T. Weis: *Virtuálna kolaborácia. Využitie IKT v edukačnom procese (Virtual Collaboration. Application of ICT in Education)*. Contribution to the Proceedings of the Conference INFOVEK 2002, Modra-Harmónia, Oct 2002.

[20] A. Dirner, U. Babiakova, A. Bílová, D. Blažek, D. Bruncko, M. Bulla, J. Demko, M. Domarácký, F. Franko, M. Ganaj, **M. Gintner**, **K. Grondžák**, J. Hlaváčová, R. Kalakay,

M. Kireš, I. Kišíková, V. Koubek, I. Lokšová, G. Martinská, M. Marušak, **I. Melo**, P. Murín, M. Murínová, A. Nogová, J. Pišút, M. Šerý, L. Štrbianová, A. Šurda, S. Tokár, S. Uličiansky, E. Vojtelová, T. Weis: *VIRTUÁLNA KOLABORÁCIA. Nové informačno – komunikačné technológie v rozvoji fyzikálneho povedomia mládeže a vo výučbe fyziky (Virtual Collaboration. New information-communication technologies in Physics Education of the Young Generation.* Proceedings of the 14 th Conference of Czech and Slovak physicists, Plzen Sep. 2002, (will be published).

[21] Musil, J. Štelina, *Štúdium termodifúzie koloidných častíc v roztokoch niektorých farbív pomocou samodifrakcie svetla (Study of Thermodiffusion of Colloid Particles in Solutions of Some Colour Matters via selfdiffraction of light),* Proceedings of the 14 th Conference of Czech a Slovak Physicists, Plzeň, Sep 9.-12. 2002, p. 514-517.

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