

**UNIVERSITY OF DEBRECEN, DEBRECEN, HUNGARY**  
**PhD SCHOOLS**

Doctoral School of **Physics**, Director: **Prof. Dr. Ferenc Kun**, DSc.

**List of courses registered till 2018**

**I. Program of atomic and molecular physics**

| Name of the lecturer                          | Title of the course  | Code       | Character<br>L,D,S,E | Hours/<br>week | Credit<br>value | Remark      |
|---|--|------------|----------------------|----------------|-----------------|-------------|
| Dr. József Cseh                               | Symmetries in Two-body and Many-body Systems                   | PF1/319-97 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                             | Many-body Calculation Techniques and Applications I.-II.       | PF1/37-93  | L                    | 2              | 2x2             | 2 semesters |
| Dr. Ágnes Nagy                                | Quantum Mechanics of Classical Chaotic Systems (Quantum Chaos) | PF1/321-00 | L                    | 2              | 2               |             |
| Dr. Ágnes Nagy                                | Non-linear Phenomena, Chaos                                    | PF1/315-93 | L                    | 2              | 2               |             |
| Dr. Ágnes Nagy                                | Density Functional Theory I.-II.                               | PF1/39-93  | L                    | 2              | 2x2             | 2 semesters |
| Dr. József Pálinkás and<br>Dr. László Sarkadi | Experimental Atomic Collision Physics                          | PF1/35-93  | L                    | 2              | 2               |             |
| Dr. László Sarkadi                            | Theory of Atomic Collisions                                    | PF1/34-93  | L                    | 2              | 2               |             |
| Dr. Károly Tőkési                             | Computational Simulation of Phenomena of Physics               | PF1/322-08 | L                    | 2              | 2               |             |
| Dr. Károly Tőkési                             | Basic Examples in Programming                                  | PF1/323-08 | L                    | 2              | 2               |             |
| Dr. Károly Tőkési<br>(Dr. Joachim Burgdörfer) | Introduction to the theory of attophysics                      | PF1/325-14 | L                    | 2              | 2               |             |
| Dr. Ágnes Vibók                               | Atomic and Molecular Physics                                   | PF1/32-93  | L                    | 2              | 2               |             |
| Dr. Ágnes Vibók                               | Atomic Physics I.-II.  | PF1/31-93  | L                    | 2              | 2x2             | 2 semesters |
| Dr. Róbert Erdélyi                            | Plasma Physics – Introduction                                  | PF1/326-18 | L                    | 2              | 2               |             |

## II. Program of nuclear physics

| Name of the lecturer                          | Title of the course   | Code       | Character<br>L,D,S,E | Hours/<br>week | Credit<br>value | Remark      |
|---|---|------------|----------------------|----------------|-----------------|-------------|
| Dr. István Angeli, Dr. Barna Nyakó            | Charge and Mass Distributions of Atomic Nuclei I.-II.       | PF2/31-93  | L                    | 2              | 2x2             | 2 semesters |
| Dr. István Angeli                             | High-Energy Accelerators I.-II.                             | PF2/340-13 | L                    | 2              | 2x2             | 2 semesters |
| Dr. József Cseh                               | Symmetries in Two-body and Many-body Systems                | PF2/32-93  | L                    | 2              | 2               |             |
| Dr. József Cseh                               | Seminars on Nuclear Physics                                 | PF2/330-97 | L                    | 2              | 2               |             |
| Dr. Julius Csikai                             | Neutron and Reactor Physics                                 | PF2/324-95 | L                    | 2              | 2               |             |
| Dr. Julius Csikai                             | Application of Nuclear Methods in Science and Technology    | PF2/325-95 | L                    | 2              | 2               |             |
| Dr. Julius Csikai                             | Radioactivity and Nuclear Physics                           | PF2/326-95 | L                    | 2              | 2               |             |
| Dr. Zoltán Elekes                             | Exotic nuclear physics                                      | PF2/342-14 | L                    | 2              | 2               |             |
| Dr. Zsolt Fülöp,<br>(Dr. Thomas Rauscher)     | Introduction to Nuclear Astrophysics                        | PF2/338-12 | L                    | 2              | 2               |             |
| Dr. Dezső Horváth                             | The Standard Model and its experimental tests I.-II.        | PF2/339-12 | L                    | 2              | 2x2             | 2 semesters |
| Dr. Attila Krasznahorkay                      | Measurements with magnetic spectrograph                     | PF2/323-94 | E                    | 2              | 2               |             |
| Dr. Attila Krasznahorkay                      | Experiments with magnetic mass separator                    | PF2/335-06 | E                    | 2              | 2               |             |
| Dr. Attila Krasznahorkay                      | Collective excitations in atomic nuclei                     | PF2/336-10 | L                    | 2              | 2               |             |
| Dr. Attila Krasznahorkay,<br>Dr. Lóránt Csige | Modern nuclear instruments and methods                      | PF2/341-14 | L                    | 2              | 2               |             |
| Dr. Tamás Lakatos, Dr. János Gál              | Electronic Measurement of Physical Quantities               | PF2/37-93  | L+Gy                 | 2+1            | 3               |             |
| Dr. István Lovas                              | Particle Physics  | PF2/38-93  | L                    | 2              | 2               |             |
| Dr. Rezső Lovas                               | (Structure and Reactions of) Light Exotic Nuclei            | PF2/333-01 | L                    | 2              | 2               |             |
| Dr. Mihály Molnár<br>(Dr. Ulrich Ott)         | Meteorites, the Early Solar System and Nuclear Astrophysics | PF2/343-14 | L                    | 2              | 2               |             |

|                                     |   |            |     |     |     |             |
|-------------------------------------|---|------------|-----|-----|-----|-------------|
| Dr. Sándor Nagy                     | Methods and Practice of Gamma Spectrometry                                    | PF2/310-93 | L+E | 2+1 | 3   |             |
| Dr. Sándor Nagy                     | Nuclear Fission   | PF2/311-93 | L   | 2   | 2   |             |
| Dr. Zoltán Papp                     | Quantum Mechanical Few-Body Problem   | PF2/331-97 | L   | 2   | 2   |             |
| Dr. Péter Raics, Dr. Sándor Sudár   | Methods for the Analysis of Nuclear Reactions                                 | PF2/312-93 | L   | 2   | 2   |             |
| Dr. Kornél Sailer                   | Introduction to Quantum Field Theory  | PF2/315-93 | L   | 2   | 2   |             |
| Dr. Kornél Sailer                   | String Theory I.-II.  | PF2/322-94 | L   | 2   | 2x2 | 2 semesters |
| Dr. Kornél Sailer                   | Symmetries and Symmetry Breaking in Quantum Field Theory I.-II.               | PF2/317-93 | L   | 2   | 2x2 | 2 semesters |
| Dr. Kornél Sailer                   | Renormalization Group Methods in Physics                                      | PF2/328-96 | L   | 2   | 2   |             |
| Dr. Kornél Sailer                   | TRIANGLE-course   | PF2/314-93 | L   | 2   | 2   |             |
| Dr. Kornél Sailer                   | Finite Temperature Quantum Field Theory                                       | PF2/327-95 | L   | 2   | 2   |             |
| Dr. Kornél Sailer                   | Non-equilibrium Statistical Physics   | PF2/313-93 | L   | 2   | 2   |             |
| Dr. Kornél Sailer, Dr. Zsolt Schram | Models and Methods in Theoretical Physics                                     | PF2/334-02 | L   | 2   | 2   |             |
| Dr. Endre Somorjai                  | Nuclear Astrophysics  | PF2/36-93  | L   | 2   | 2   |             |
| Dr. János Timár                     | The rotating nucleus: an experimental view                                    | PF2/337-11 | L   | 2   | 2   |             |
| Dr. Zoltán Trócsányi                | Standard Model  | PF2/321-94 | L   | 2   | 2   |             |
| Dr. Tamás Vertse                    | Numerical Methods in Practice   | PF2/329-97 | E   | 2   | 2   |             |
| Dr. Tamás Vertse                    | Nuclear Models I.-II.   | PF2/35-93  | L   | 2   | 2x2 | 2 semesters |
| Dr. László Végh                     | Advanced Quantum Mechanics  | PF2/318-93 | L+D | 2+1 | 2   |             |
| Dr. László Zolnai                   | Angular Distribution Measurement of the Elastically Scattered alpha-particles | PF2/320-93 | E   | 3   | 3   |             |
| Dr. László Zolnai                   | Sciencetechnology   | PF2/332-00 | L   | 2   | 2   |             |
| Dr. Róbert Erdélyi                  | Plasma Physics – Introduction   | PF2/344-18 | L   | 2   | 2   |             |
| Dr. Zsolt Fülöp, ( Dr. Kai Zuber)   | Neutrino Physics  | PF2/345-18 | L   | 2   | 2   |             |

### III. Program of solid state physics and material science

| Name of the lecturer                       | Title of the course                                      | Code       | Character<br>L,D,S,E | Hours/<br>week | Credit<br>value | Remark      |
|--|--|------------|----------------------|----------------|-----------------|-------------|
| Dr. Dezső Beke                             | Solid State Physics I.-II.                               | PF3/31-93  | L                    | 2              | 2x2             | 2 semesters |
| Dr. Dezső Beke                             | Plastic Deformations and Fracture                        | PF3/319-93 | L                    | 2              | 2               |             |
| Dr. Dezső Beke                             | New Materials and Technologies                           | PF3/33-93  | L                    | 2              | 2               |             |
| Dr. Dezső Beke                             | Nonequilibrium Materials                                 | PF3/322-94 | L                    | 2              | 2               |             |
| Dr. Dezső Beke                             | Micro- and nanomagnetism I.-II.                          | PF3/331-97 | L                    | 2              | 2x2             | 2 semesters |
| Dr. Dezső Beke                             | Advance Topics in Nanotechnology                         | PF3/341-12 | L                    | 2              | 2               |             |
| Dr. Csaba Cserháti                         | Electron Microscopy                                      | PF3/316-93 | L                    | 2              | 2               |             |
| Dr. Attila Csík                            | X-ray related technics for solid state studies           | PF3/346-14 | L+E                  | 2+1            | 2               |             |
| Dr. Lajos Daróczi                          | Martensitic transformations                              | PF3/342-13 | L                    | 2              | 2               |             |
| Dr. Gábor Erdélyi                          | Solid State Reactions                                    | PF3/39-93  | L                    | 2              | 2               |             |
| Dr. Zoltán Erdélyi                         | Diffusion and Segregation in Nanostructures              | PF3/339-02 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                          | Theoretical Solid State Physics                          | PF3/32-93  | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi, Dr. Dezső Beke          | Phase-transitions I.-II.                                 | PF3/35-93  | L                    | 2              | 2x2             | 2 semesters |
| Dr. Zsolt Gulácsi                          | Magnetism  | PF3/320-93 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                          | Many-body Calculation Techniques and Applications I.-II. | PF3/323-94 | L                    | 2              | 2x2             | 2 semesters |
| Dr. Zsolt Gulácsi                          | Quantum Phase Transitions                                | PF3/334-97 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                          | Spin Glasses   | PF3/335-97 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                          | Polarization, Screening and Response Functions           | PF3/336-98 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi (Dr. deChatel P.)        | Description of Superconductivity                         | PF3/338-00 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                          | Many-body systems in periodic potential                  | PF3/340-08 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi,<br>(Dr. Miklós Gulácsi) | Theory of Strongly Correlated Systems                    | PF3/343-14 | L                    | 2              | 2               |             |
| Dr. Zsolt Gulácsi                          | Quantum information and quantum computation              | PF3/344-14 | L                    | 2              | 2               |             |
| Dr. Ferenc Kun                             | Computer simulation I.-II.                               | PF3/327-95 | L                    | 2              | 2x2             | 2 semesters |
| Dr. Sándor Kökényesi                       | Solid State- and Optoelectronics                         | PF3/332-97 | L                    | 2              | 2               |             |

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|--|--|------------|---|---|---|
| Dr. László Kövér                           | Investigations of Solid State Surfaces                     | PF3/311-93 | L | 2 | 2 |
| Dr. László Kövér                           | Electronic Structure of Surface and<br>Interface Formation | PF3/326-95 | L | 2 | 2 |
| Dr. Gábor Langer                           | Vacuumtechnique and Production of Thin<br>Films            | PF3/317-93 | L | 2 | 2 |
| Dr. Gábor Langer                           | Thin Films   | PF3/324-94 | L | 2 | 2 |
| Dr. Sándor Mészáros                        | Superconductivity  | PF3/36-93  | L | 2 | 2 |
| Dr. Sándor Mészáros                        | Modern Methods of Investigation in the<br>Material Science | PF3/37-93  | L | 2 | 2 |
| Dr. István Szabó                           | Atomic resolution microscopy                               | PF3/329-96 | L | 2 | 2 |
| Dr. István Szabó                           | Intermetallic compounds                                    | PF3/330-96 | L | 2 | 2 |
| Dr. István Szabó,<br>(Dr. László Szunyogh) | Introduction to spintronics                                | PF3/345-14 | L | 2 | 2 |

#### IV. Program of **physical methods in interdisciplinary researches**

| Name of the lecturer   | Title of the course  | Code       | Character<br>L,D,S,E | Hours/<br>week | Credit<br>value | Remark                             |
|--|--|------------|----------------------|----------------|-----------------|------------------------------------|
| Dr. György Csepura   | Radiation protection   | PF4/36-04  | L                    | 2              | 2               |                                    |
| Dr. István Csige   | Subsurface Flow  | PF4/315-12 | L                    | 2              | 2               |                                    |
| Dr. Julius Csikai  | Application of Neutrons in Elemental<br>Analysis   | PF4/33-93  | L                    | 2              | 2               |                                    |
| Dr. Róbert Erdélyi   | Waves  | PF4/320-15 | L                    | 2              | 2               |                                    |
| Dr. Róbert Erdélyi   | Solar Magnetohydrodynamics   | PF4/321-15 | L                    | 2              | 2               |                                    |
| Dr. Róbert Erdélyi   | Advanced Solar Magnetohydrodynamics  | PF4/322-16 | L                    | 2              | 2               |                                    |
| Dr. Róbert Erdélyi   | Sunpy  | PF4/323-16 | L                    | 2              | 2               |                                    |
| Dr. Árpád Kiss et al.  | Atomic- and Nuclear Microanalysis  | PF4/31a-93 | L                    | 2              | 2               |                                    |
| Dr. Árpád Kiss et al.  | Atomic- and Nuclear Microanalysis Labor  | PF4/31b-93 | E                    | 4              | 4               | connected to the<br>prev. lectures |
| Dr. Zsófia Kertész,<br>Dr. Mihály Molnár<br>Dr. Zsófia Kertész | Atmosphere and Climate   | PF4/39-09  | L                    | 2              | 2               |                                    |
|  | Atmospheric Aerosol Sampling Procedures<br>and Analysis Techniques Using Ion Beam<br>and XRF | PF4/311-12 | L                    | 2              | 2               |                                    |
| Dr. Ferenc Kun   | Computer simulation I.-II.   | PF4/310-10 | L                    | 2              | 2x2             | 2 semesters                        |
| Dr. Ferenc Kun   | Physics of Complex Systems   | PF4/313-12 | L                    | 2              | 2               |                                    |
| Dr. Ferenc Kun,<br>(Dr. Illés Farkas)                          | Perl Programming and Networks in<br>Computational Biology                                    | PF4/317-14 | L                    | 2              | 2               |                                    |
| Dr. Ferenc Kun,<br>(Dr. Frank Raichel)                         | Criticality and Complex Systems  | PF4/318-14 | L                    | 2              | 2               |                                    |
| Dr. Mihály Molnár,<br>Dr. László Palcsu                        | Radioactive Dating   | PF4/38-09  | L                    | 2              | 2               |                                    |
| Dr. Mihály Molnár,<br>(Dr. Timothy Jull)                       | Geochronology and Paleoclimate   | PF4/316-13 | L                    | 2              | 2               |                                    |
| Dr. Mihály Molnár<br>(Dr. Ulrich Ott)                          | Meteorites, the Early Solar System and<br>Nuclear Astrophysics                               | PF4/319-14 | L                    | 2              | 2               |                                    |

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|--|---|------------|---|---|---|
| Dr. Ágnes Nagy   | Non-linear Phenomena, Chaos                             | PF4/312-12 | L | 2 | 2 |
| Dr. László Palcsu,<br>Dr. István Csige,<br>Dr. Mihály Molnár | Nuclear Environmental Protection                        | PF4/37-09  | L | 2 | 2 |
| Dr. Andrea Somogyi   | Synchrotron radiation based X-ray<br>microprobe methods | PF4/35-04  | L | 2 | 2 |
| Dr. Róbert Erdélyi   | Plasma physics – Introduction                           | PF4/324-18 | L | 2 | 2 |
| Dr. Ferenc Kun   | Complex Networks  | PF4/325-18 | L | 2 | 2 |
| Dr. Ferenc Kun,<br>( Dr. Géza Ódor)                          | Universality Classes in Non-equilibrium<br>Systems      | PF4/326-18 | L | 2 | 2 |
| Dr. István Szabó   | Atomic Resolution Microscopy                            | PF4/327-18 | L | 2 | 2 |

## V. Program of **particle physics**

| Name of the lecturer               | Title of the course   | Code       | Character<br>L,D,S,E | Hours/<br>week | Credit<br>value | Remark      |
|------------------------------------|---|------------|----------------------|----------------|-----------------|-------------|
| Dr. István Angeli                  | High-Energy Accelerators I.-II.   | PF5/31-95  | L                    | 2              | 2x2             | 2 semesters |
| Dr. József Cseh                    | Symmetries in Two-body and Many-body<br>Systems                             | PF5/321-97 | L                    | 2              | 2               |             |
| Dr. Gábor Dávid, Dr. Sándor Nagy   | Modelling, Simulation, Analysis in<br>Experimental Particle Physics I.-III. | PF5/33-95  | L                    | 2              | 3x2             | 3 semesters |
| Dr. Gábor Dávid                    | Data Acquisition, Triggering and<br>Online Monitoring                       | PF5/331-10 | L                    | 2              | 2               |             |
| Dr. Dezső Horváth                  | The Standard Model and its experimental<br>tests I.-II.                     | PF5/326-00 | L                    | 2              | 2x2             | 2 semesters |
| Dr. Dezső Horváth                  | Experimental techniques of particle physics                                 | PF5/327-01 | L                    | 2              | 2               |             |
| Dr. Ádám Kardos                    | Introduction to Effective Field Theories                                    | PF5/339-18 | L                    | 2              | 2               |             |
| Dr. Tamás György Kovács            | Statistical field theory  | PF5/334-14 | L                    | 2              | 2               |             |
| Dr. Sándor Nagy                    | Quantum renormalization group   | PF5/338-17 | L                    | 2              | 2               |             |
| Dr. István Nándori                 | Basics of functional renormalization group<br>method                        | PF5/337-16 | L                    | 2              | 2               |             |
| Dr. Péter Raics                    | Particle Detectors  | PF5/311-95 | L                    | 2              | 2               |             |
| Dr. Kornél Sailer                  | Introduction to Quantum Field Theory  | PF5/312-95 | L                    | 2              | 2               |             |
| Dr. Kornél Sailer                  | Symmetries and Symmetry Breaking in<br>Quantum Field Theory I.-II.          | PF5/314-95 | L                    | 2              | 2x2             | 2 semesters |
| Dr. Kornél Sailer                  | General Relativity  | PF5/323-98 | L                    | 2              | 2               |             |
| Dr. Kornél Sailer, Dr. Sándor Nagy | Functional renormalization group method                                     | PF5/333-13 | L                    | 2              | 2               |             |
| Dr. Kornél Sailer                  | Finite Temperature Quantum Field Theory                                     | PF5/334-13 | L                    | 2              | 2               |             |
| Dr. Kornél Sailer                  | Cosmology   | PF5/335-14 | L                    | 2              | 2               |             |
| Dr. Zsolt Schram                   | Lattice Field Theory  | PF5/322-97 | L                    | 2              | 2               |             |
| Dr. Zsolt Schram                   | Variational principles of theoretical physics                               | PF5/332-11 | L                    | 2              | 2               |             |
| Dr. Gábor Somogyi                  | Methods of computing Feynman integrals                                      | PF5/336-15 | L                    | 2              | 2               |             |
| Dr. Zoltán Trócsányi               | Standard Model  | PF5/317-95 | L                    | 2              | 2               |             |
| Dr. Zoltán Trócsányi               | Grand Unified Theories  | PF5/318-95 | L                    | 2              | 2               |             |



|                                   |   |            |   |   |     |             |
|-----------------------------------|---|------------|---|---|-----|-------------|
| Dr. Zoltán Trócsányi              | Perturbative Quantum Chromodynamics I.-II.          | PF5/320-97 | L | 2 | 2x2 | 2 semesters |
| Dr. Gyula Zilizi                  | Electronics in the Experimental Particle<br>Physics | PF5/316-95 | L | 2 | 2   |             |
| Dr. Zsolt Fülöp, ( Dr. Kai Zuber) | Neutrino Physics                                    | PF5/340-18 | L | 2 | 2   |             |

Abbreviations: L = Lectures, D = Discussions, S = Seminars, E = Exercises

## List of the research topics registered till 2018

### I. Program of atomic- and molecular physics

| Supervisor          | Title of the research topics  | Code       | Open for 2015 Students/From                             |
|---------------------|---|------------|---|
| Dr. Sándor Biri     | Investigation of highly charged heavy ion plasmas   | PF1/427-03 | -   |
| Dr. László Gulyás   | Many-electron processes in simple atomic and molecular collisions   | PF1/442-15 | +   |
| Dr. Gábor Halász    | The role of degeneracy in molecular systems   | PF1/436-08 | -   |
| Dr. László Kövér    | Chemical and solid-state effects in Auger transitions   | PF1/420-95 | +   |
| Dr. Ágnes Nagy      | Density functional theory   | PF1/43-93  | +   |
|                     |   |            | István Andrejkovics/93<br>Péter Süle/93<br>Tamás Gál/96 |
| Dr. Ágnes Nagy      | Quantum phase transitions, classical and quantum chaos  | PF1/439-13 | -   |
| Dr. József Pálinkás | The role of the electron-electron interaction in ion-atom collision processes   | PF1/49-93  | -   |
|                     |   |            | Attila Báder/94   |
| Dr. József Pálinkás | Simulation of the charge changing processes in an ECR plasma  | PF1/424-97 | -   |
|                     |   |            | Csaba J. Koncz/97                                       |
| Dr. József Pálinkás | Changes on the surface of solids caused by bombardment with exotic ions   | PF1/432-08 | -   |
| Dr. József Pálinkás | Investigation of the plasma of an ECR ion source with X-ray spectroscopic methods   | PF1/433-08 | -   |
| Dr. József Pálinkás | The role of atomic physics processes in the formation of plasma-states  | PF1/440-13 | -   |
| Dr. Sándor Ricz     | Influence of the post collision interaction on the angular distribution of Auger electrons  | PF1/412-93 | +   |
|                     |   |            | László Tóth/93<br>György Viktor/93<br>Levente Ábrók/15  |
| Dr. Sándor Ricz     | Investigation of laser photon-matter interaction with method of high energy resolution angle resolved photo-electron spectroscopy (HAPES) | PF1/438-13 | -   |

|   |  |            |   |                    |
|---|--|------------|---|--------------------|
| Dr. László Sarkadi                      | Investigations of forward electron emission in atomic collisions   | PF1/410-93 | - | Ljiljana Viktor/93 |
| Dr. Béla Sulik                          | Detailed study of the ionization processes by measuring multiple differential electron ejection cross section in ion-atom collisions | PF1/422-96 | - |                    |
| Dr. Béla Sulik                          | Relativistic atomic physics at storage rings   | PF1/429-06 | - |                    |
| Dr. Béla Sulik                          | Atomic and molecular collisions relevant for radiation damages in bio-molecules and some ion technology processes                    | PF1/434-08 | - |                    |
| Dr. Béla Sulik                          | The interaction of insulator nanocapillaries with ions: Ion-beam guiding and focusing  | PF1/435-08 | - |                    |
| Dr. Károly Tőkési                       | Interaction of charged particles with atoms and surfaces   | PF1/428-03 | + | Ziaecian Iman/18   |
| Dr. Ágnes Vibók and<br>Dr. Gábor Halász | Photo-induced nonadiabatic quantum molecular dynamics  | PF1/431-08 | - |                    |
| Dr. Ágnes Vibók                         | Laser-induced nonadiabatic processes in molecular systems  | PF1/437-11 | - |                    |
| Dr. Ágnes Vibók                         | Photo-induced electron and nuclear dynamics in molecules on an attosecond to few femtosecond time scale                              | PF1/441-14 | - |                    |

## II. Program of **nuclear physics**

| Supervisor   | Title of the research topics   | Code       | Open for 2015 Students/From |                        |
|--|--|------------|-----------------------------|------------------------|
| Dr. Julius Csikai  | Investigation of fast neutron dosimetry and therapy                      | PF2/42-93  | -                           | Rita Dóczi/94          |
| Dr. József Cseh  | Developments and applications of algebraic nuclear models                | PF2/43-93  | +                           |                        |
| Dr. Julius Csikai,   | Determination of differential and integral neutron data for applications | PF2/424-95 | -                           | Abdurazak M. Megrab/95 |
| Dr. Julius Csikai,<br>Dr. Péter Raics and<br>Dr. Ferenc Tárkányi | Application of cyclotron neutron source in science and technology        | PF2/44-93  | -                           | Ali D. Majdeddin/94    |
| Dr. Julius Csikai and  | Investigation of fast neutron induced reactions                          | PF2/45-93  | -                           | László Oláh/96         |

|  |  |             |   |                   |
|--|--|-------------|---|-------------------|
| Dr. Sándor Sudár                           |  |             |   |                   |
| Dr. Julius Csikai                          | Bulk media assay by neutrons and gamma-rays  | PF2/429-97  | - |                   |
| Dr. Julius Csikai                          | Application of nuclear methods for identification of illicit materials                     | PF2/430-01  | - |                   |
| Dr. Julius Csikai                          | Chemical analytical applications based on prompt-gamma radiation                           | PF2/414-93  | - |                   |
| Dr. Julius Csikai                          | Determinations of hydrogen content and the C/H atomic ratio in bulk samples using neutrons | PF2/440-08  | - |                   |
| Dr. Julius Csikai                          | Measurements of leakage neutron spectra and reaction cross-sections                        | PF2/441-08  | - |                   |
| Dr. Zsolt Dombrádi                         | Nuclear structure studies by use of radioactive beams                                      | PF2/451-10  | - |                   |
| Dr. Zoltán Elekes                          | Experimental study of exotic nuclei  | PF2/454-13  | + |                   |
| Dr. Zsolt Fülöp                            | Studies in nuclear astrophysics  | PF2/436-06  | - |                   |
| Dr. Zsolt Fülöp                            | Studies in exotic nuclear physics  | PF2/437-06  | - |                   |
| Dr. Zsolt Fülöp                            | Study of the life time of radioactive nuclei   | PF2/449-10  | - |                   |
| Dr. János Gál                              | Investigation of charged particle detectors used for nuclear physics experiments           | PF2/427-96, | - |                   |
| Dr. György Gyürky and<br>Dr. Zoltán Elekes | Study of nuclear reactions relevant for the synthesis of heavy elements                    | PF2/453-11  | - |                   |
| Dr. György Gyürky                          | Experimental study of astrophysically relevant radiative capture reactions                 | PF2/455-17  | - |                   |
| Dr. Gábor Gyula Kiss                       | Explosive nucleosynthesis scenarios  | PF2/456-17  | - |                   |
| Dr. Attila Krasznahorkay                   | Nuclear spectroscopy investigation of the super-deformed states in the actinide region     | PF2/48-93   | - | Mátyás Hunyadi/95 |
| Dr. Attila Krasznahorkay                   | Study of giant resonances and measurement of neutron-skin thicknesses in radioactive beams | PF2/431-02  | - |                   |
| Dr. Attila Krasznahorkay                   | Probing a light neutral boson in internal pair creation                                    | PF2/446-08  | + |                   |
| Dr. András Kruppa                          | Symbolic and numerical computational methods of few body problems of quantum mechanics     | PF2/447-08  | - |                   |
| Dr. Géza Lévai                             | Potential problems of quantum mechanics and their applications                             | PF2/427-96  | - | Tamás Francia/96  |

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|--|---|-------------|---|
| Dr. István Lovas                                 | Phase transitions of nuclear matter<br>periodic structures of nuclear matter  | PF2/410-93  | - |
| Dr. István Lovas and<br>Dr. László Kovács        | Astronomy in the Teaching Physics<br>(The use of Nuclear Physics)   | PF2/435-02  | - |
| Dr. Rezső Lovas                                  | Microscopic description of nuclear systems;   | PF2/411-93  | - |
| Dr. Rezső Lovas                                  | Nuclear fission with swift fragments  | PF2/443-08  | - |
| Dr. József Molnár                                | Digital processing of detector signals applied<br>in nuclear medicine and in nuclear physics  | PF2/445-08  |   |
| Dr. József Molnár                                | Development of Position Sensitive Detector Systems<br>with Digital Signal Processing Electronics<br>for Nuclear Physics and Medical Imaging | PF2/450-10  | - |
| Dr. Barna Nyakó                                  | Study of the structure of medium-heavy nuclei in heavy-<br>ion reactions; Extreme nuclear deformations                                      | PF2/413a-93 | - |
| Dr. Barna Nyakó                                  | Study of the structure of medium-heavy nuclei in heavy-<br>ion reactions; Shape changes in nuclei   | PF2/413b-93 | - |
| Dr. Péter Raics                                  | Teaching Nuclear Physics in Secondary School;<br>Nuclear transmutations and their importance in energetics                                  | PF2/434a-02 | - |
| Dr. Péter Raics                                  | Teaching Nuclear Physics in Secondary School;<br>Interaction of radiations with matter  | PF2/434b-02 | - |
| Dr. Péter Raics                                  | Teaching Nuclear Physics in Secondary School  | PF2/444-08  | - |
| Dr. Kornél Sailer and<br>Dr. Sándor Nagy         | Non-locality in quantum mechanics in quantum<br>field-theoric terms   | PF2/439-07  | - |
| Dr. Kornél Sailer and<br>Dr. Sándor Nagy         | Functional renormalization group for open quantum<br>systems  | PF2/452-11  | - |
| Dr. Zsolt Schram                                 | Thermodynamics in non-abelian lattice gauge theories  | PF2/442-08  | - |
| Dr. Dorottya Kunné Sohler                        | Nuclear structure studies by gamma-spectroscopic methods  | PF2/448-09  | - |
| Dr. Endre Somorjai                               | Experimental study of astrophysical p-process   | PF2/432-02  | - |
| Dr. Ferenc Tárkányi                              | Investigation of cross sections of charged particle<br>induced nuclear reactions for basic science  | PF2/418a-93 | - |
| Dr. János Timár and<br>Dr. Dorottya Kunné Sohler | Interaction between collective and individual motions<br>in rotating nuclei   | PF2/438-06  | - |

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|----------------------|---|-------------|---|
| Dr. Ferenc Tárkányi  | Investigation of cross sections of charged particle induced nuclear reactions for application in practice | PF2/418b-93 | - |
| Dr. Zoltán Trócsányi | Next-to-leading order calculations in perturbative QCD  | PF2/423-94  | - |
| Dr. Tamás Vertse     | Calculation of the continuum in spherical and deformed potentials using complex scaling                   | PF2/419-94  | - |

### III. Program of **solid state physics and material science**

| Supervisor                               | Title of the research topics  | Code        | Open for 2015 Students/From                     |
|--|---|-------------|---|
| Dr. Dezső Beke                           | Martensitic transformation in shape memory alloys   | PF3/428-99  | -   |
| Dr. Dezső Beke<br>(Dr. Miklós Kis Varga) | Production of nanocrystalline metastable alloys by mechanical alloying                                      | PF3/414b-95 | -   |
| Dr. Dezső Beke                           | Production and magnetic properties of nanocrystalline materials   | PF3/421-97  | -   |
| Dr. Dezső Beke                           | Investigation of semiconductor nanostructures   | PF3/442-05  | -   |
| Dr. Dezső Beke                           | Nanodiffusion   | PF3/443-05  | -   |
| Dr. Dezső Beke                           | Smart materials: Investigation of metallic and polymer shape memory materials                               | PF3/448-08  | -   |
| Dr. Dezső Beke                           | Investigation of noisy character of phase transformations   | PF3/456-17  | -   |
| Dr. Csaba Cserháti                       | Investigation of Kirkendall shift on the nanoscale  | PF3/455-16  | -   |
| Dr. Csaba Cserháti                       | Atomic movements in 2 and 3 dimensional structures  | PF3/456-16  | -   |
| Dr. Csaba Cserháti                       | Risk based approaches in reliability assessment of corroded pressurised equipments in oil- and gas industry | PF3/457-17  | -   |
| Dr. Lajos Daróczi                        | Statistical noises in martensitic materials   | PF3/453-13  | +<br>László Zoltán Tóth/13<br>Melinda Bolgár/15 |

|   |   |            |   |  |
|---|---|------------|---|--|
| Dr. Gábor Erdélyi                           | Investigation of diffusion processes in oxide-ceramics  | PF3/45-93  | - | Miklós Barkóczy/94<br>István Vallasek/94 |
| Dr. Gábor Erdélyi                           | Grain boundary diffusion in nanostructured materials  | PF3/422-97 | - |  |
| Dr. Gábor Erdélyi                           | Grain boundary transport and segregation in intermetallic compounds                               | PF3/429-99 | - |  |
| Dr. Gábor Erdélyi                           | Diffusion phenomena in amorphous and crystalline systems  | PF3/447-08 | - |  |
| Dr. Zoltán Erdélyi                          | Investigation of diffusion and solid state reactions in thin layers: experiments and simulations  | PF3/451-10 | - |  |
| Dr. Zoltán Erdélyi                          | Study of nanostructured materials of high application potential                                   | PF3/454-14 | + |  |
| Dr. Zsolt Gulácsi                           | Theoretical study of $t - J$ model  | PF3/431-99 | - |  |
| Dr. Zsolt Gulácsi                           | Variational description of the strongly correlated systems  | PF3/42-93  | - | Zsolt Szabó/94                           |
| Dr. Zsolt Gulácsi                           | Theoretical study of lattice models in low-concentration limit                                    | PF3/432-99 | - |  |
| Dr. Zsolt Gulácsi                           | Exact solutions related to many-body systems  | PF3/417-96 | + |  |
| Dr. Zsolt Gulácsi                           | Superconducting properties in layered compounds   | PF3/413-95 | - | Péter Gurin/96                           |
| Dr. Zsolt Gulácsi                           | Theoretical study of the periodic Anderson model  | PF3/423-97 | - | Iván Orlik/97                            |
| Dr. Zsolt Gulácsi                           | Ordered phases in layered systems   | PF3/424-97 | - |  |
| Dr. Zsolt Gulácsi                           | Characterization of strongly correlated systems   | PF3/452-11 | + |  |
| Dr. Gábor Katona                            | Structural transformations in thin films  | PF3/459-17 | - |  |
| Dr. Sándor Kökényesi and<br>Dr. Sándor Biri | Photostimulated processes in semiconductor nanostructures   | PF3/436-02 | + |  |
| Dr. Sándor Kökényesi                        | Size-limited characteristics of semiconductor nanocomposites                                      | PF3/437-02 | + |  |
| Dr. Sándor Kökényesi                        | Radiation stimulated transformations in amorphous material and its application in optoelectronics | PF3/438-02 | + |  |
| Dr. László Kövér                            | Chemical and solid-state effects in Auger transitions   | PF3/416-95 | + |  |
| Dr. Ferenc Kun                              | Study of non-equilibrium processes of magneto- and electrorheological fluids                      | PF3/440-03 | + | Imre Varga/02                            |

|                                      |  |            |   |                     |
|--------------------------------------|--|------------|---|---------------------|
| Dr. Ferenc Kun                       | Study of fractures and fragmentation processes in solid states               | PF3/444-06 | + |                     |
| Dr. Gábor Langer                     | Production and investigation of physical properties of metallic multilayers  | PF3/49-93  | - | Andrian V. Dudás/94 |
| Dr. Gábor Langer and Dr. Attila Csík | Investigation of thermal stability of multilayers                            | PF3/433-99 | - |                     |
| Dr. Sándor Mészáros                  | Dynamics of magnetic flux in grain boundary junctions of high temperature    | PF3/43-93  | - | József Lindmájer/95 |
| Dr. Ákos Nemcsics                    | Investigation of molecular-beam-epitaxially grown GaAs-based nano-structures | PF3/458-17 | - |                     |
| Dr. István Szabó                     | Diffusion studies in intermetallic compounds                                 | PF3/430-99 | - |                     |
| Dr. István Szabó                     | Study of nanostructured materials by scanning probe microscopy               | PF3/427-98 | - |                     |
| Dr. István Szabó                     | Application of magnetic noises in material science                           | PF3/445-07 | - |                     |
| Dr. István Szabó                     | Sensor and measurement developments to biomechanical studies                 | PF3/449-09 | + | János Kiss/15       |
| Dr. Kálmán Vad                       | Investigation of the magnetic flux dynamics in superconducting thin films    | PF3/415-95 | - |                     |
| Dr. Kálmán Vad                       | Relaxation phenomena in magnetic structures                                  | PF3/425-95 | - | László Kerekes/97   |
| Dr. Kálmán Vad                       | Investigation of thin film solar cells                                       | PF3/450-09 | - |                     |
| Dr. Kálmán Vad                       | Study of nanometer scale surface atomic motion                               | PF3/459-18 | - |                     |

#### IV. Program of **physical methods in interdisciplinary researches**

| Supervisor        | Title of the research topics                           | Code       | Open for 2015 Students/From |
|-------------------|--|------------|-----------------------------|
| Dr. Tünde Baranyi | Study of solar activity and solar irradiance           | PF4/443-17 | -                           |
| Dr. István Csige  | Radon in mofettes                                      | PF4/421-02 | -                           |
| Dr. István Csige  | Characterization of radon potential of building sites  | PF4/430-09 | -                           |
| Dr. István Csige  | Hydrodynamic modeling of contaminated subsurface flows | PF4/440-13 | -                           |



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|--|--|------------|---|----------------------|
| Dr. Julius Csikai                            | Improvement of solid state nuclear track-etched detector techniques and their applications.                              | PF4/422-03 | - | Krisztián Hámori/03  |
| Dr. Julius Csikai                            | Detection and identification of illicit drugs, explosives and anti-personnel landmines using neutron based techniques    | PF4/434-10 | - |                      |
| Dr. Julius Csikai and<br>Dr. András Fenyvesi | Investigations on excitation functions of neutron induced reactions in the 8-12 MeV problem range                        | PF4/435-10 | - |                      |
| Dr. Róbert Erdélyi                           | Role of marcospicules in the dynamcis of the solar atmosphere  | PF4/442-15 | + | Tamás Sándor Kiss/15 |
| Dr. Róbert Erdélyi                           | Magnetohydrodynamic waves in the solar atmosphere  | PF4/444-18 | - |                      |
| Dr. Róbert Erdélyi                           | Developing state-of-the-art Space Weather forecast tools   | PF4/445-18 | - |                      |
| Dr. Róbert Erdélyi                           | Studying the evolution of solar faculae over the solar cycle   | PF4/446-18 | - |                      |
| Dr. András Fenyvesi                          | Radiation damage and radiation protection problems caused by fast neutrons   | PF4/433-10 | - |                      |
| Dr. Róbert Huszánk                           | Investigation of physical and chemical effects of ion irradiation on different materials and their possible applications | PF4/444-17 | - |                      |
| Dr. Zsófia Kertész                           | Characterization of atmospheric aerosols by nuclear microanalytics   | PF4/438-11 | + |                      |
| Dr. Árpád Kiss                               | Application of ion beam analysis techniques to the investigation of archaeological findings and art-objects              | PF4/412-94 | - |                      |
| Dr. Ferenc Kun                               | Study of fractures and fragmentation processes in solid states   | PF4/436-11 | + |                      |
| Dr. Ferenc Kun                               | Dynamics and statistics of avalanches in complex systems   | PF4/437-11 | + | Batool Attia/18      |
| Dr. Mihály Molnár                            | Environmental impact of nuclear power plants   | PF4/418-99 | - |                      |
| Dr. Mihály Molnár                            | Development of alternative methods for detection of fossil carbon-dioxide in the atmosphere                              | PF4/431-09 | + |                      |
| Dr. Mihály Molnár                            | Development and application of isotope analitical methods to identify natural and antropogenic carbon sources            | PF4/447-18 | - |                      |
| Dr. István Nándori                           | Theoretical study of relaxation in magnetic nanoparticle systems   | PF4/439-12 |   |                      |
| Dr. László Palcsu                            | Development and application of novel analytical methods in palaeoclimatology and isotope hydrology                       | PF4/441-14 | - |                      |

|                   |  |            |   |                 |
|-------------------|--|------------|---|-----------------|
| Dr. László Palcsu | Noble gases dissolved in fluid inclusions of dripstones as climate change indicators hydroecological state of the catchment area of upper Tisza Region | PF4/427-08 | - |                 |
| Dr. Zoltán Papp   | Investigation of the behaviour of radon and its progeny in outdoor and indoor air  | PF4/426-08 | - |                 |
| Dr. István Rajta  | Proton Beam Micromachining   | PF4/432-09 | + | István Vajda/15 |
| Dr. Zita Szikszai | Ion beam analytical methods in heritage science  | PF4/443-17 | - |                 |
| Dr. Imre Uzonyi   | Ion beam microanalysis in geological research  | PF4/429-08 | - |                 |

#### V. Program of **particle physics**

| Supervisor                               | Title of the research topics  | Code       | Open for 2015 Students/From |                                    |
|--|---|------------|-----------------------------|------------------------------------|
| Dr. Gábor Dávid                          | Neutral meson production in Au+Au collisions at RHIC  | PF5/424-02 | +                           |                                    |
| Dr. Gábor Dávid                          | Sources of direct photons in heavy ion collisions at RHIC                                   | PF5/425-02 | +                           |                                    |
| Dr. Gábor Dávid                          | Search for signatures of the Quark-Gluon Plasma in Au+Au collisions at RHIC                 | PF5/426-02 | -                           |                                    |
| Dr. Dezső Horváth                        | Test of the equivalence of matter and antimatter at the Antiproton Decelerator of CERN      | PF5/440-10 | -                           |                                    |
| Dr. Ádám Kardos                          | Developing a numerical framework to compute radiative corrections in Quantum Chromodynamics | PF5/451-18 | -                           |                                    |
| Dr. Tamás György Kovács                  | Quantum-chromodynamics on the lattice   | PF5/443-13 | -                           |                                    |
| Dr. Sándor Nagy                          | Functional renormalization group method in quantum theories                                 | PF5/446-15 | -                           |                                    |
| Dr. István Nándori                       | Renormalization group method and phase transitions  | PF5/441-11 | -                           | Viktória Borbélyné Bacsó/14        |
| Dr. István Nándori                       | Compactness, differentiability and renormalization  | PF5/448-16 | -                           |                                    |
| Dr. Kornél Sailer and<br>Dr. Sándor Nagy | Functional renormalization group for open quantum systems                                   | PF5/442-12 | +                           | József Kovács/12<br>Zoltán Péli/15 |
| Dr. Zsolt Schram                         | Topological excitations and quark confinement   | PF5/439-08 | -                           |                                    |

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|----------------------|---|------------|---|
| Dr. Zsolt Schram     | Thermodynamics in non-abelian lattice gauge theories                                    | PF5/447-15 | - |
| Dr. Gábor Somogyi    | Describing elementary particle collisions with high precision                           | PF5/445-15 | - |
| Dr. Zoltán Trócsányi | Calculation of radiative corrections in perturbative QCD                                | PF5/428-02 | - |
| Dr. Zoltán Trócsányi | Searching for new particles with the CMS detector at the LHC                            | PF5/438-08 | - |
| Dr. Balázs Ujvári    | Simulation of the experiment measuring the weight of the neutrino                       | PF5/449-16 | - |
| Dr. Balázs Ujvári    | Hardware development in particle physics  | PF5/450-16 | - |
| Dr. Viktor Veszprémi | Search for supersymmetric particles using the CMS detector at the Large Hadron Collider | PF5/444-14 | - |

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| André José Neves<br>Marques de Ornelas | MSc in Phys.  | INR HAS     | II.    |                | Dr. György Gyürky    |
| Gábor Riczu                            | MSc in Phys.  | INR HAS     | II.    |                | Dr. József Cseh      |
| Erzsébet Sóki                          | MSc in Env.   | INR HAS     | IV.    |                | Dr. István Csige     |
| Zoltán Szőr                            | MSc in Phys.  | IEP UD      | V.     |                | Dr. Zoltán Trócsányi |

#### Enrolled in 2013

| Name                       | Degree             | Work. place | Progr. | E-mail address | Supervisor                               |
|----------------------------|--------------------|-------------|--------|----------------|--|
| Márton Bartók<br>Trócsányi | MSc in Phys.       | IEP UD      | V.     |                | Dr. Zoltán                               |
| István Péter Bojtos        | MSc in Phys.       | INR HAS     | II.    |                | Dr. József Molnár                        |
| András Bolyog              | MSc in Mat. Scien. | INR HAS     | II.    |                | Dr. József Molnár                        |
| Péter Hajdú                | MSc in Tech.       | INR HAS     | I.     |                | Dr. Sándor Biri,<br>Dr. Sándor Kökényesi |
| Olaksandr Molnár           | MSc in Phys.       | IEP UD      | III.   |                | Dr. Sándor Kökényesi                     |
| János Tomán                | MSc in Mat. Scien. | ISSP UD     | III.   |                | Dr. Zoltán Erdélyi                       |
| László Zoltán Tóth         | MSc in Mat. Scien. | ISSP UD     | III.   |                | Dr. Lajos Daróczi                        |

#### Enrolled in 2012

| Name | Degree | Work. place | Progr. | E-mail address | Supervisor |
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|                     |               |         |      |                      |
|---------------------|---------------|---------|------|----------------------|
| Róbert Balog        | MSc in Phys.  | IEP UD  | V.   | Dr. Dezső Horváth    |
| Derco Roman         | MSc in Phys.  | IEP UD  | V.   | Dr. Zoltán Trócsányi |
| József Kovács       | MSc in Phys.  | ITP UD  | V.   | Dr. Kornél Sailer    |
| Gábor Molnár        | MSc in Phys.  | ISSP UD | III. | Dr. Dezső Beke       |
| Gyula Nagy          | MSc in Env.   | INR HAS | IV.  | Dr. István Rajta     |
| Zsófia Török        | MSc in Env.   | INR HAS | IV.  | Dr. Zsófia Kertész   |
| Judit Rácz          | MSc in Teach. | INR HAS | IV.  | Dr. István Nándori   |
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| Name            | Degree        | Work. place | Progr. | E-mail address | Supervisor           |
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| Gábor Balogh    | MSc in Phys.  | ISSP UD     | III.   |                | Dr. István Szabó     |
| László Csedreki | MSc in Env.   | INR HAS     | IV.    |                | Dr. Árpád Kiss       |
| Péter Herczku   | MSc in Phys.  | INR HAS     | I.     |                | Dr. Béla Sulik       |
| Zsuzsanna Danku | MSc in Phys.  | ITP UD      | IV.    |                | Dr. Ferenc Kun       |
| Edit Fenyvesi   | MSc in Phys.  | IEP UD      | IV.    |                | Dr. Zoltán Trócsányi |
| Sándor Kovács   | MSc in Env.   | INR HAS     | I.     |                | Dr. Béla Sulik       |
| Alajos Makovec  | MSc in Phys.  | INR HAS     | II.    |                | Dr. József Molnár    |
| Gergő Pál       | MSc in Phys.  | INR HAS     | III.   |                | Dr. Ferenc Kun       |
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| Name           | Degree       | Work. place | Progr. | E-mail address | Supervisor           |
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| János Karancsi | MSc in Phys. | IEP UD-INR  | HAS V. |                | Dr. Zoltán Trócsányi |
| István Major   | MSc in Phys. | INR HAS     | IV.    |                | Dr. Mihály Molnár    |
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|---------------------|--------------|---------|------|--------------------------|
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| Bence Parditka      | MSc in Phys. | ISSP UD | III. | Dr. Zoltán Erdélyi       |
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| Réka Trencsényi     | MSc in Phys. | ITP UD  | III. | Dr. Zsolt Gulácsi        |
| Gábor Tornyai Tamás | MSc in Phys. | INR HAS | II.  | Dr. Attila Krasznahorkay |
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| Ádám Kardos        | MSc in Phys. | IEP UD-INR HAS | V.     |                | Dr. Zoltán Trócsányi |
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| Riku Attila Lovics | MSc in Phys. | INR HAS        | III.   |                | Dr. Kálmán Vad       |
| Attila Papp        | MSc in Phys. | ITP UD         | I.     |                | Dr. Ágnes Vibók      |
| Richárd Rácz       | MSc in Phys. | INR HAS        | I.     |                | Dr. Sándor Biri      |
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| Györgyi Glodán        | MSc in Phys. | ISSP UD     | III.   |                | Dr. Dezső Beke       |
| Róbert Janovics       | MSc in Phys. | INR HAS     | IV.    |                | Dr. Éva Svingor      |
| László Papp           | MSc in Phys. | INR HAS     | IV.    |                | Dr. Éva Svingor      |
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| Bálint Radics       | MSc in Phys  | INR HAS     | V.     |                | Dr. Dezső Horváth     |
| Szabolcs Szilasi    | MSc in Phys  | INR HAS     | IV.    |                | Dr. Árpád Zoltán Kiss |
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| Roland Bogdan | MSc in Phys | IEP UD      | III.   |                | Dr. Sándor Kökényesi |
| Géza Berek    | MSc in Phys | INR HAS     | II.    |                | Dr. Barna Nyakó,     |

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| Gábor Gyula Kiss | MSc in Phys   | INR HAS | II.  |
| Miklós Kiss      | MSc in Teach  | IEP UD  | V.   |
| Viktor Takáts    | MSc in Phys   | ISSP UD | III. |
| László Tóth      | MSc in Phys   | INR HAS | I.   |

Dr. János Timár  
 Dr. Éva Svingor  
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 Dr. Endre Somorjai  
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| Erik Dobos           | MSc in Phys  | INR HAS     | IV.    |                    | Dr. Árpád Kiss<br>Dr. Ildikó Kiss |
| Éva Fekete           | MSc in Phys. | INR HAS     | I.     |                    | Dr. Sándor Biri                   |
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| Gábor Somogyi     | Msc in Phys. | INR HAS     | V.     |                  | Dr. Zoltán Trócsányi |

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| Gábor Anda         | MSc. in Phys. | ISSP UD     | III.   |                | Dr. Langer Gábor         |
| Dr. Katalin Bogdán | dr. univ..    | ISSP UD     | III.   |                | Dr. Dezső Beke           |
| Gábor Bóna         | MSc. in Phys. | IEP UD      | V.     |                | Dr. Péter Raics          |
|                    |               |             |        |                | Dr. Gábor Dávid          |
| Dr. Margit Csatlós | dr. univ      | INR HAS     | II.    |                | Dr. Attila Krasznahorkay |
| Dr. Zoltán Dezső   | dr. univ.     | DEP UD-HAS  | IV.    |                | Dr. Árpád Kiss           |
| Tamás Gyórfi       | MSc. in Phys. | IEP UD      | II.    |                | Dr. Péter Raics          |
| István Iván        | MSc. in Phys. | IEP UD      | III.   |                | Dr. Sándor Kökényesi     |
| Péter Kávrán       | MSc. in Phys. | ITP UD      | III.   |                | Dr. István Lovas         |
| Dr. László Molnár  | dr. univ.     | IEP UD      | II.    |                | Dr. István Lovas         |
| Dr. Ervin Szegedi  | dr. univ      | ISSP UD     | III.   |                | Dr. Dezső Beke           |
| Iván Valastyán     | MSc. in Phys. | DEP UD-HAS  | IV.    |                | Dr. Árpád Kiss           |
| Imre Varga         | MSc. in Phys. | IEP UD      | III.   |                | Dr. Ferenc Kun           |
| Dr. Klára Varga    | dr. univ.     | DEP UD-HAS  | IV.    |                | Dr. Árpád Kiss           |
| Róbert Vértesi     | Msc. in Phys. | INR HAS     | V.     |                | Dr. Dezső Horváth        |

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| Name              | Degree          | Work. place | Progr. | E-mail address | Supervisor        |
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| Sándor Egri       | Dipl. in Teach. | INR HAS     | I.     |                | Dr. László Kövér  |
| Gilbert Fayl      | MSc in Phys.    | IEP UD      | II.    |                | Dr. Julius Csikai |
| Zsuzsa Jánosfalvi | Dipl. in Phys.  | ITP UD      | I.     |                | Dr. Ágnes Nagy    |
| Gábor Katona      | Dipl. in Phys.  | ISSP UD     | III.   |                | Dr. Dezső Beke    |
| Zoltán Máté       | Dipl. in Phys.  | INR HAS     | I.     |                | Dr. László Kövér  |



|               |                |         |      |  |                   |
|---------------|----------------|---------|------|--|-------------------|
| József Nyéki  | Dipl. in Phys. | ISSP UD | III. |  | Dr. Gábor Erdélyi |
| Tícia Ricsóka | Dipl. in Phys. | INR HAS | I.   |  | Dr. Ákos Kövér    |
| Tamás Vértesi | Dipl. in. Eng. | IEP UD  | I.   |  | Dr. Ágnes Vibók   |

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| Zoltán Elekes      | Dipl. in Phys.  | INR HAS     | IV.    |                | Dr. Árpád Z Kiss.     |
| Bertalan Juhász    | Dipl. in Phys.  | INR HAS     | I.     |                | Dr. Dezső Horváth     |
| Krisztián Kapta    | Dipl. in Phys.  | ISSP UD     | III.   |                | Dr. Gábor Langer      |
| Endre Kovács       | Dipl. in Phys.  | ITP UD      | III.   |                | Dr. Zsolt Gulácsi     |
| Levente Molnár     | Dipl. in Phys.  | IEP UD      | V.     |                | Dr. László Gutay      |
| Gábor Pszota       | Dipl. in Phys.  | IEP UD      | V.     |                | Dr. Tibor Sztaricskai |
| Gusztáv Áron Sziki | Dipl. in Teach. | INR HAS     | IV.    |                | Dr. László Gutay      |
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| Viktor Veszprémi   | Dipl. in Phys.  | IEP UD      | V.     |                | Dr. Árpád Z Kiss      |
|                    |                 |             |        |                | Dr. Zoltán Trócsányi  |
|                    |                 |             |        |                | Dr. László Baksay     |
|                    |                 |             |        |                | Dr. Péter Raics       |

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| Name           | Degree          | Work. place | Progr. | E-mail address | Supervisor          |
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| Attila Bende   | Dipl. in Phys.  | ITP UD      | I.     |                | Dr. Ágnes Vibók     |
| Zoltán Berényi | Dipl. in Phys.  | INR HAS     | IV.    |                | Dr. József Pálinkás |
| István Futó    | Dipl. in Phys.  | INR HAS     | IV.    |                | Dr. Éva Svingor     |
| Róbert Juhász  | Dipl. in Phys.  | INR HAS     | III.   |                | Dr. Miklós Kis-     |
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| Beáta Király   | Dipl. in Teach. | IEP UD      | II.    |                | Dr. Julius Csikai   |
| László Lugosi  | Dipl. in Phys.  | INR HAS     | I.     |                | Dr. László Sarkadi  |

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| János Zsolt Mezei  | Dipl. in Phys.  | INR HAS | II.     |    | Dr. Rezső Lovas   |
| Sándor Nagy        | Dipl. in Phys.  | ITP UD  | V.      |    | Dr. Kornél Sailer |
| Zoltán Miklós Papp | Dipl. in Phys.  | ISSP UD | III.    |    | Dr. Gábor Langer  |
| Csilla Szabó       | Dipl. in Teach. |         | INR HAS | I. | Dr. Aladár Valek  |
| Norbert Takács     | Dipl. in Phys.  | ISSP UD | III.    |    | Dr. Dezső Beke    |
| Péter Tarján       | Dipl. in Phys.  | IEP UD  | V.      |    | Dr. László Baksay |
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| El-Tayeb Mohamed M. Eisa | M. Sc. in Phys. | IEP UD      | II.    |                | Dr. Julius Csikai    |
| Zoltán Erdélyi           | Dipl. in Phys.  | ISSP UD     | III.   |                | Dr. Dezső Beke       |
| Lajos Kenéz              | Dipl. in Phys.  | INR HAS     | I.     |                | Dr. József Pálincás  |
| Zoltán Nagy              | Dipl. in Phys.  | INR HAS     | V.     |                | Dr. Zoltán Trócsányi |
| Andrea Gabriella Orbán   | Dipl. in Phys.  | INR HAS     | I.     |                | Dr. Béla Sulik       |
| László Palcsu            | Dipl. in Phys.  | INR HAS     | IV.    |                | Dr. Ede Hertelendi   |
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| Salem Mohamed Abd El-Samad | M. Sc. in Phys.    | INR HAS     | II.    |                  | Dr. Ferenc Tárkányi      |
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- I. Atomic and Molecular physics
- II. Nuclear Physics

- III. Solid State Physics and Material Science
- IV. Physical Methods in Interdisciplinary Researches
- V. Particle Physics

Abbreviations:

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AJU = Attila József University, Szeged, Hungary

CRIC HAS = Central Research Institute for Chemistry of the Hungarian Academy of Sciences, Budapest, Hungary

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ITP UD = Institute of Theoretical Physics of the University of Debrecen, Debrecen, Bem tér 18/c, Hungary

IAI UD = Institute of Application of Isotopes of the University of Debrecen, Debrecen, Egyetem tér 1., Hungary

IEP UD = Institute of Experimental Physics of the University of Debrecen, Debrecen, Bem tér 18/a, Hungary

ISSP UD = Institute of Solid State Physics of the University of Debrecen, Debrecen, Egyetem tér 1., Hungary

FI UD = Faculty of Informatics of the University of Debrecen, Debrecen, Egyetem tér 1., Hungary

HNGI = Hungarian National Geological Institute, Budapest, Hungary

PU = Purdue University, West Lafayette, IN, USA

REU = Roland Eötvös University, Budapest, Hungary

RITP HAS = Research Institute for Technological Physics of the Hungarian Academy of Sciences, Budapest, Hungary

RIPNP HAS = Research Institute for Particle and Nuclear physics of the Hungarian Academy of Sciences, Budapest, Hungary

SUNY = Stony Brook University, NY, USA

TUT = Technical University at Temesvár, Romania

UA = University of Alabama, Tuscaloosa, AL, USA

UU = University of Uzhgorod, Ukraine

Wigner = MTA-DE Particle Physics Research Group

HAS-UD PPRG = Hungarian Academy of Sciences-University of Debrecen Particle Physics Research Group

UÓ = University Óbuda