Study plan

Name of study plan: Jaderná a ásticová fyzika

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Nuclear and Particle Physics

Type of study: Follow-up master full-time

Required credits: 0

Elective courses credits: 120 Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 0

The role of the block: P

Code of the group: NMSPJCF1

Name of the group: MDP P_J FN 1st year

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 10 courses

Credits in the group: 0

Note on the group: Studenti povinně absolvují alespoň jednu skupinu předmětů E, I nebo T

	Name of the course / Name of the group of courses					
Code	(in case of groups of courses the list of codes of their members)	Completion	Credits	Scope	Semester	Role
	Tutors, authors and guarantors (gar.)					
02KTPA1	Quantum Field Theory 1 Václav Zatloukal Václav Zatloukal Martin Štefa ák (Gar.)	Z,ZK	8	4P+2C	Z	Р
02KTPA2	Quantum Field Theory 2 Petr Jizba Václav Zatloukal Martin Štefa ák (Gar.)	Z,ZK	8	4P+2C	L	Р
02MTD	Modern Detectors Jaroslav Adam Jaroslav Adam (Gar.)	ZK	2	2P+0C	Z	Р
02SE1	Seminar 1 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	3	3S	Z	Р
02SE2	Seminar 2 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	3	3S	L	Р
02SZD1	Statistical Data Analysis 1 Miroslav Myška Miroslav Myška (Gar.)	Z,ZK	4	2P+2C	Z	Р
02SZD2	Statistical Data Analysis 2 Miroslav Myška Miroslav Myška (Gar.)	Z,ZK	4	2P+2C	L	Р
02SDSD	Detector Systems and Data Acquisition Michal Broz Martin Štefa ák Michal Broz (Gar.)	ZK	2	2P+0C	L	Р
02VUJC1	Research Project 1 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	6	6C	Z	Р
02VUJC2	Research Project 2 Martin Štefa ák, Jaroslav Biel ík, Michal Broz, Petr Chaloupka, Dominika Mašlárová, Boris Tomášik, Jakub Vícha, Solangel Rojas Torres, Michal Mar išovský, Jaroslav Biel ík Jaroslav Biel ík (Gar.)	KZ	8	8C	L	Р

Characteristics of the courses of this group of Study Plan: Code=NMSPJCF1 Name=MDP P_J FN 1st year

construction, ways of using and constrains. Emphasis is given also to electronic detector control and voltage suppliers.

02K I PA1	Quantum Field Theory 1	Z,ZK	8
The lecture aims to intro	duce the students to both fundamental and applied parts of quantum field theory. The focus is in particular on equations of r	elativistic quantur	n mechanics,
canonical quantization of	of scalar and bispinor field, perturbation theory (Feynman's rules) and basics of renormalization. The content of the lecture ca	n serve as a base	for further study
in fields of exactly solva	ble models, theory of critical phenomena, molecular chemistry and biochemistry or quantum gravity.		
02KTPA2	Quantum Field Theory 2	Z,ZK	8
The lecture aims at intro	oducing the students to the Feynman's functional integral and its applications. The focus is on broadening the knowledge of n	nodern parts of re	lativistic and
non-relativistic quantum	field theory and statistical physics. The content of the lecture can serve as a base for further study in fields of exactly solvable	ole models, theory	of critical
phenomena, molecular	chemistry and biochemistry or quantum gravity.		
02MTD	Modern Detectors	ZK	2
Lectures will cover all ty	pes of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of	detectors, materia	als used for their

02SE1 Seminar 1 The aim of the seminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fields of particle physics studied in research tasks and diploma theses of their colleagues. Participants will be informed about recent results in particle physics. 02SE2 3 Seminar 2 The aim of the seminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fields of particle physics studied in research tasks and diploma theses of their colleagues. Participants will be informed about recent results in particle physics The course is primarily focused on practical application of methods of experimental data analysis. Students obtain knowledge of different statistical methods and their usage, fitting methods, and testing of hypothesis. The course quickly recapitulates basis of mathematical probability theory but it is recommended to attend a full course of the mathematical probability. 02SZD2 Statistical Data Analysis 2 Individual student's work will include implementation and testing of a program for analysis of generated data sample. Background understanding of Monte Carlo generators for hadron collision will be explained. The course covers methods of data smearing and subsequent deconvolution of data. Basics understanding and usage of neural networks and machine learning will be covered. 02SDSD **Detector Systems and Data Acquisition** The goal of the lecture is to present knowledge of modern detector systems. We will concentrate on the aspects of construction and usage for charged-particle tracking, momentum and energy measurement as well as particle identification via various methods from time-of-flight to transition radiation. The lecture will cover also the topic of signal shaping and processing, digitalization, data acquisition and further data processing at the modern collider experiments. Research Project 1 The research project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common regular meetings and discussions

The research project is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during common

ΚZ

8

Code of the group: NMSPJCF2

Name of the group: MDP P_J FN 2nd year

Research Project 2

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 6 courses

Credits in the group: 0 Note on the group:

regular meetings and discussions.

02VUJC2

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
02DPJC1	Master Thesis 1 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	10	10C	Z	Р
02DPJC2	Master Thesis 2 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	20	20C	L	Р
02SE3	Seminar 3 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	3	3S	Z	Р
02SE4	Seminar 4 Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	3	3S	L	Р
02ZQCD	Quantum Chromodynamics Jana Biel íková Jan epila Jana Biel íková (Gar.)	Z,ZK	6	3+2	Z	Р
02ZELW	Introduction to Theory of Electroweak Interactions Boris Tomášik, Jana Biel íková Boris Tomášik Boris Tomášik (Gar.)	Z,ZK	6	3P+2C	Z	Р

02DPJC1	Master Thesis 1	Z	10
The master thesis is	is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the	project supervisor	during commo
regular meetings ar	nd discussions.		
02DPJC2	Master Thesis 2	Z	20
The master thesis is	is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the	project supervisor	during commo
regular meetings ar	nd discussions.		
02SE3	Seminar 3	Z	3
The aim of the sem		i comment i	
THE AITH OF THE SEIN	ninar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel	as of particle physic	cs studied in
	infar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel I diploma theses of their colleagues. Participants will be informed about recent results in particle physics.	as of particle physi	cs studied in
		as of particle physic	3
research tasks and 02SE4	diploma theses of their colleagues. Participants will be informed about recent results in particle physics.	Z	3
research tasks and 02SE4 The aim of the sem	diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4	Z	3
research tasks and 02SE4 The aim of the sem	diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4 ninar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel	Z	3
research tasks and 02SE4 The aim of the sem research tasks and 02ZQCD	I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4 Seminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel diploma theses of their colleagues. Participants will be informed about recent results in particle physics.	Z ds of particle physic	3 cs studied in
research tasks and 02SE4 The aim of the sem research tasks and 02ZQCD The goal of these le	I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4 ninar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Quantum Chromodynamics	Z ds of particle physic Z,ZK avour symmetry, ste	3 cs studied in 6 udies of nucleo
research tasks and 02SE4 The aim of the sem research tasks and 02ZQCD The goal of these lestructure in deep inc	I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4 ninar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Quantum Chromodynamics ectures is to acquire knowledge about basic principles of strong interaction starting from the constituent quark model and SU(3) fl	Z ds of particle physic Z,ZK avour symmetry, ste	3 cs studied in 6 udies of nucleo
research tasks and 02SE4 The aim of the sem research tasks and 02ZQCD The goal of these lestructure in deep inc	I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4 Ininar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Quantum Chromodynamics actures is to acquire knowledge about basic principles of strong interaction starting from the constituent quark model and SU(3) flelastic scattering of leptons on nucleons and parton model to basics of Quantum Chromodynamics and its practical applications in	Z ds of particle physic Z,ZK avour symmetry, ste	3 cs studied in 6 udies of nucleo
research tasks and 02SE4 The aim of the sem research tasks and 02ZQCD The goal of these lestructure in deep intin high energy physio2ZELW	I diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Seminar 4 hinar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fiel diploma theses of their colleagues. Participants will be informed about recent results in particle physics. Quantum Chromodynamics excutres is to acquire knowledge about basic principles of strong interaction starting from the constituent quark model and SU(3) fleelastic scattering of leptons on nucleons and parton model to basics of Quantum Chromodynamics and its practical applications in sics and physics of ultra-relativistic heavy-ion collisions.	Z ds of particle physic Z,ZK avour symmetry, steet the context of current the current t	3 cs studied in 6 udies of nucleo

Name of the block: Compulsory elective courses

the topics covered in the lectures (such as first measurements of W and Z gauge bosons, Higgs boson discovery) are envisioned.

Minimal number of credits of the block: 0

The role of the block: PV

Code of the group: NMSPJCFSE

Name of the group: MDP P_J FN group E experimental

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses

Credits in the group: 0

Note on the group:

Studenti povinně absolvují alespoň jednu skupinu předmětů E, I nebo T

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
02EXSH	Extreme States of Matter Michal Šumbera Jaroslav Biel ík Jaroslav Biel ík (Gar.)	ZK	2	2P+0C	Z	PV
02FUJS	Physics of Ultrarelativistic Nuclear Collisions Katarína K ížková Gajdošová, Karel Šafa ík Karel Šafa ík Karel Šafa ík (Gar.)	ZK	2	2P+0C	L	PV

Characteristics of the courses of this group of Study Plan: Code=NMSPJCFSE Name=MDP P_J FN group E experimental

O2EXSH Extreme States of Matter

Lectures will provide basics in states of matter in extreme conditions. It deals with broad spectra of phenomena from electromagnetic plasma through phases of nuclear matter at high temperatures or densities to highly speculative forms of matter that may be responsible for initially accelerated expansion of the Universe in its early stages (inflation) or for its current acceleration (dark energy). Lectures may also serve as a brief introduction to parts of modern cosmology connected to nuclear and particle physics.

O2FUJS Physics of Ultrarelativistic Nuclear Collisions

ZK 2

The goal of this subject is to introduce students the principles of physics of heavy-ion collisions at large energies. Students will gain insight into phases of a nuclear collision, properties of the created matter (quark-clupp plasma (QGP)), probes which contain information about the QGP and other phases of the collision, and knowledge that these signals brought to us

of the created matter (quark-gluon plasma (QGP)), probes which contain information about the QGP and other phases of the collision, and knowledge that these signals brought to us based on the recent measurements at present experiments.

Code of the group: NMSPJCFSI

Name of the group: MDP P_J FN group I Instrumental

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 2 courses

Credits in the group: 0

Note on the group:

Studenti povinně absolvují alespoň jednu skupinu předmětů E, I nebo T

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
02UC1	Particles Accelerators 1 Miroslav Kr s Miroslav Kr s (Gar.)	ZK	2	2P+0C	Z	PV
02UC2	Particle Accelerators 2 Miroslav Kr s Miroslav Kr s Miroslav Kr s (Gar.)	ZK	2	2+0		PV

Characteristics of the courses of this group of Study Plan: Code=NMSPJCFSI Name=MDP P_J FN group I Instrumental

02UC1	Particles Accelerators 1	ZK	2
Introduction to physics	and technology of classical (electrostatic and radiofrequency) particle accelerators.		
02UC2	Particle Accelerators 2	ZK	2
Introduction to physics	and technology of modern and next generation accelerators based on laser and plasma technology.		

Code of the group: NMSPJCFST

Name of the group: MDP P_J FN group T Theoretical

Requirement credits in the group:

Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 0

Note on the group:

Studenti povinně absolvují alespoň jednu skupinu předmětů E, I nebo T

11010 011 1110	group.	-	p.		_,	=
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
02GTR	General Theory of Relativity Boris Tomášik Boris Tomášik (Gar.)	Z,ZK	4	2P+2C	Z	PV

Characteristics of the courses of this group of Study Plan: Code=NMSPJCFST Name=MDP P_J FN group T Theoretical

02GTR General Theory of Relativity

Z.ZK

4

The goal is to learn the basics of General Relativity theory as well as its applications, mainly in cosmology. The students will get acquainted with the starting points of General Relativity. The course includes the explanation of necessary mathematics: differential geometry. Classic results are derived, like the precession of Mercury, gravitational frequency shift and gravitational bending of light. The participants learn about Schwarzschild metrics and its solution leading to black holes. In the application part the Friedman-Robertson-Walker metrics is introduced and dynamics of the Universe is discussed.

Name of the block: Elective courses Minimal number of credits of the block: 0

The role of the block: V

Code of the group: NMSPJCFV

Name of the group: MDP P_J FN Optional courses

Requirement credits in the group: Requirement courses in the group:

Credits in the group: 0 Note on the group:

Note on the g	•					
Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
02AQCD	Applied Quantum Chromodynamics at High Energies Ján Nem lík N	ZK	2	2+0		V
02ACF1	Astroparticle physics 1 Jakub Vicha Jakub Vicha (Gar.)	ZK	2	2P+0C	Z	V
02ACF2	Astroparticle physics 2 Jakub Vícha Jakub Vícha Jakub Vícha (Gar.)	ZK	2	2P+0C	L	V
01DAS	Data science Ji í Franc Ji í Franc (Gar.)	KZ	3	1P+2C		V
02FAJ	Physics of Atomic Nuclei Ji í Adam, Petr Veselý Ji í Adam Ji í Adam (Gar.)	ZK	4	4+0	L	V
02BSM	Physics beyond the Standard Model Zden k Hubá ek Zden k Hubá ek (Gar.)	Z	2	2P+0C	Z	V
02JSP	Nuclear Spectroscopy Vladimír Wagner Martin Štefa ák Vladimír Wagner (Gar.)	Z,ZK	5	2+2	L	V
02KMP	Quantum Many-Body Problem in the Theory of Atomic Nuclei Petr Veselý Martin Štefa ák Petr Veselý (Gar.)	ZK	2	2P+0C	Z	V
02MAT	Materials for Experimental Nuclear Physics Libor Škoda Martin Štefa ák Libor Škoda (Gar.)	ZK	2	2+0		V
18MEMC	Monte Carlo Method František Gašpar, Miroslav Virius Miroslav Virius (Gar.)	Z,ZK	4	2P+2C	Z	V
01NEUR1	Neural Networks and their Applications 1 Martin Hole a, František Hakl František Hakl František Hakl (Gar.)	ZK	2	2+0		V
1800P	Object Oriented Programming Miroslav Virius Miroslav Virius Miroslav Virius (Gar.)	Z	2	2C	Z	V
02LPA	Particle plasma accelerators Miroslav Kr s Miroslav Kr s (Gar.)	ZK	2	2P+0C	L	V
17PRE	Computer Control of Experiments Martin Kropík Martin Kropík Martin Kropík (Gar.)	Z,ZK	3	2+1	Z	V
02REP	Matrix Lie group representations Ji í Hrivnák Ji í Hrivnák Ji í Hrivnák (Gar.)	Z	2	2+0	Z	V
02ROZ3	Seminar on Quark-Gluon Plasma 3 Jaroslav Biel ik Jaroslav Biel ik Jaroslav Biel ik (Gar.)	Z	2	2P+0C	Z	V
02ROZ4	Seminar on Quark-Gluon Plasma 4 Jaroslav Biel ík, Boris Tomášik, Jana Biel íková Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	2	2P+0C	L	V
02ROZ5	Seminar on Quark-Gluon Plasma 5 Jaroslav Biel ík Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	2	2P+0C	Z	V
02ROZ6	Seminar on Quark-Gluon Plasma 6 Jaroslav Biel ík, Boris Tomášik, Jana Biel íková Jaroslav Biel ík Jaroslav Biel ík (Gar.)	Z	2	2P+0C	L	V
02SPRA1	Special Practicum 1 Lukáš Novotný, Jan epila Jan epila Jan epila (Gar.)	KZ	6	0+4	Z	V
02SPRA2	Special Practicum 2 Jan epila Jan epila (Gar.)	KZ	6	0+4	L	V
01SUP	Start-up Project P emysl Rubeš P emysl Rubeš (Gar.)	KZ	2	2P+0C		V
02PRF	Selected topics from probability theory for physicists Michal Šumbera Michal Šumbera Michal Šumbera (Gar.)	Z	2	2P+0C	Z	V
02VPJRS	Selected topics from relativistic nucleus-nucleus collisions Barbara Antonina Trzeciak Martin Štefa ák Barbara Antonina Trzeciak (Gar.)	Z,ZK	3	2P+1C	L	V

02VS2	Workshop 2	Z	1	7D	Z	V
02VS3	Jaroslav Biel ik Jaroslav Biel ik Jaroslav Biel ik (Gar.) Workshop 3 Jaroslav Biel ik Jaroslav Biel ik Jaroslav Biel ik (Gar.)	Z	1	7D	Z	V
	Jaroslav Biel ik Jaroslav Biel ik Jaroslav Biel ik (Gar.)					
	 courses of this group of Study Plan: Code=NMSPJCFV Name= plied Quantum Chromodynamics at High Energies 	MDP P_J F	N Option	1	es ZK	2
	pried Quaritum Chromodynamics at Flight Energies ovide basic applications of quantum chromodynamicks that corresponds to understandir	ng of the dynami	cs of proces	l l		
on proton and nuclear target	s that are currently measured by experiments at RHIC and LHC colliders. Complement	-		-		
will be provided.	transitials physics 1				71/	
	troparticle physics 1 ory of astroparticle physics 2. Introduction to astronomy (scales, observation windows,	types of objects.	. contempor		ZK s) 3. Energy	2 spectrum of
	ties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5	, ,	•		, 0,	•
	position of cosmic radiation (types of measurements, results, open problems) 7. Sprea	-		-	_	-
,	 Sources of cosmic radiation (exotic sources, acceleration mechanisms) Indirect deficiency (fluorescence and cherenkov techniques, reconstruction) Surface detection 					•
12. Detection of gamma rays	s (principles, experiments)					
	troparticle physics 2	5 "		1	ZK	2
	ection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. nd use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models				,	•
	tion of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astropar		-			
•	mology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of ne	,		•		
experiments, proton decay, of between detection of neutral	double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dat and charged particles)	rk matter (tneor	y, experimer	nts) 12. Multii	messengers	(connections
	ta science				ΚZ	3
	ematical modeling methods, statistics and machine learning needs wide range of tasks				_	
	units for development and implementation into the production. Last, but not least, the co of required tools will be presented on lectures. Further, these procedures will be applied		•	•		
	ourse, students will present their results to other teams.	a during exercise	53 WILLI ALL C	inpliasis on t	earr collabo	ration, projec
02FAJ Ph	ysics of Atomic Nuclei				ZK	4
	ction, few-body systems, G matrix, nuclear properties, nuclear models (single-particle magneticles, public properties), plactromagnetic and week processes in public public			-		
	particles, nuclear deformations), electromagnetic and weak processes in nuclei, nuclea ysics beyond the Standard Model	reactions (kine	manos and	mechanisms	Z	2
· ·	hysics is one of the most succesful physical theories. It describes the elementary partic	les which form t	he matter a	ا nd their elect	ļ.	
-	ever an incomplete theory and there are several questions which it can not answer. The	goal of the lectu	re is to revi	ew the missi	ng points in	the Standard
model and show potential di	rections where the new physics beyond the Standard model could be found.					
02 ISB Nu				7	7k	5
· ·	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimenta	I nuclear physics	s and variou		,ZK s as well. Le	5 ecture will be
Nuclear spectroscopy complete devoted to fundamentals of	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimenta X- and gamma- ray, charged particle and neutron spectroscopy.	ıl nuclear physics	s and variou	s application	s as well. Le	ecture will be
Nuclear spectroscopy complete devoted to fundamentals of 202KMP	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. lantum Many-Body Problem in the Theory of Atomic Nuclei			s application	s as well. Le	ecture will be
Nuclear spectroscopy complete devoted to fundamentals of 202KMP Quit Nuclear Hamiltonian and of the second	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimenta X- and gamma- ray, charged particle and neutron spectroscopy.	s in nuclei 3. The	eory of the e	energy densit	s as well. Le	ecture will be 2 in nuclei 4.
Nuclear spectroscopy complete of the voted to fundamentals of the complete of the voted to fundamentals	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. lantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic	s in nuclei 3. The	eory of the e	energy densit	zK y functional	2 in nuclei 4. om Phase
Nuclear spectroscopy complete devoted to fundamentals of O2KMP Qu 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For f Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetr	s in nuclei 3. The	eory of the e	energy densit ff Approxima 12. Coupled (s as well. Le	2 in nuclei 4. om Phase od 13. Bohr
Nuclear spectroscopy complete devoted to fundamentals of 202 CMP Quantum 1. Nuclear Hamiltonian and Theory of the energy density Approximation 9. Equation of collective model Q2MAT Materials of the spectrum	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For of Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetre atterials for Experimental Nuclear Physics	s in nuclei 3. The ck methods 7. Ta ies in many-bod	eory of the eamm-Dancor y methods 1	energy densit ff Approxima 2. Coupled (s as well. Le	2 in nuclei 4. om Phase od 13. Bohr
Nuclear spectroscopy complete devoted to fundamentals of 202 MMP Quantum 1. Nuclear Hamiltonian and Theory of the energy density Approximation 9. Equation of collective model Q2MAT Matter Matter 1. Matter 1. Matter 1. Matter 1. Matter 2. Matter 2	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For f Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetr	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe	eory of the eamm-Dancoo y methods 1	as application an application	s as well. Le	2 in nuclei 4. om Phase od 13. Bohr
Nuclear spectroscopy complete devoted to fundamentals of 302KMP Qu 1. Nuclear Hamiltonian and Theory of the energy density Approximation 9. Equation of collective model Q2MAT Matter Matter Matter 1. Matter	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For off Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetre atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials ph	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe	eory of the eamm-Dancoo y methods 1	as application an application	s as well. Le	2 in nuclei 4. om Phase od 13. Bohr
Nuclear spectroscopy complete devoted to fundamentals of 202KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model Q2MAT Matchis lecture is designed for suclear physics, particularly 18MEMC Mc This course is devoted to the	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For form of Method 10. Generator Coordinate Method 11. Restoration of symmetrical symmetrical for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties a content Carlo Method numerical method Monte Carlo and to its selected applications.	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe	eory of the eamm-Dancoo y methods 1	as application an application and application applicat	s as well. Le ZK y functional tion 8. Rand Cluster Meth ZK v used in the	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta
Nuclear spectroscopy complete devoted to fundamentals of 202KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model Q2MAT Match 12 Match 12 Match 13 Memory 14 Memory 15 Memory 16 Memory 16 Memory 16 Memory 16 Memory 17 Memory 17 Memory 17 Memory 18	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For form of Method 10. Generator Coordinate Method 11. Restoration of symmetrical symmetrical for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties a content Carlo Method numerical method Monte Carlo and to its selected applications. For experimental Networks and their Applications 1	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe	eory of the eamm-Dancoo y methods 1	as application an application and application applicat	s as well. Le ZK y functional tion 8. Rand Cluster Meth ZK v used in the	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta
Nuclear spectroscopy complete voted to fundamentals of 202KMP Qu 1. Nuclear Hamiltonian and Theory of the energy density Approximation 9. Equation of collective model Q2MAT Mathics and This lecture is designed for suclear physics, particularly 18MEMC Mc This courseis devoted to the Q1NEUR1 Networds: Neural networks,	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For of Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetr atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at onte Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe	eory of the eamm-Dancoo y methods 1	as application an application and appl	zK y functional tion 8. Rand Cluster Method v used in the ZK ZK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4
Nuclear spectroscopy complete of the following spectroscopy complete of the following spectroscopy of the designation of the collective model of the spectroscopy of the energy density approximation 9. Equation of collective model ozmat Mathematical Mathematical Mathematical Spectroscopy of the collective model ozmat Mathematical	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For form of Method 10. Generator Coordinate Method 11. Restoration of symmetrical symmetrical for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties a content Carlo Method numerical method Monte Carlo and to its selected applications. For experimental Networks and their Applications 1	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use	eory of the e amm-Danco y methods 1 ect to materi in experime	energy densit ff Approxima 2. Coupled (zK y functional tion 8. Rand Cluster Method v used in the zK zK zK zK zK zK z	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta
Nuclear spectroscopy complete voted to fundamentals of 202KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model 02MAT Marticle is designed for some conclear physics, particularly 18MEMC Models of the control of the	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Iantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetrical symmetrical for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties and their Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in principle plasma accelerators	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use	eory of the e mm-Danco y methods 1 ect to materi in experime	energy densit ff Approxima 2. Coupled (als frequently ent. Z	zK y functional tion 8. Rand Cluster Method v used in the zK zK zK zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 2
Nuclear spectroscopy complete voted to fundamentals of 202KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model 02MAT Match M	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-Ford Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetre atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at onte Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in proticle plasma accelerators and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If the properties are concerned on technologies uded in proticle plasma accelerators and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If the properties are concerned on technologies uded in proticle plasma accelerators and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If the properties are concerned on technologies uded in proticle plasma accelerators and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If the properties are concerned on technologies uded in proticle plasma accelerators and technology.	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use	eory of the eamm-Danco y methods 1 ect to materia in experime	as application an application and appl	ZK y functional tion 8. Rand Cluster Meth ZK v used in the ZK ZK ZK Z Ztion 4. Plass	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Matchis lecture is designed for suclear physics, particularly 18MEMC Mo2MEMEMC Mo2MEMEMEMEMEMEMEMEMEMEMEMEMEMEMEMEMEMEM	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Iantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetrical symmetrical for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties and their Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in principle plasma accelerators	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use ogram developm Plasma instabiliti n in plasma wave	eory of the eamm-Danco y methods 1 ect to materia in experime	energy densit ff Approxima 2. Coupled (als frequently ent. Z lasma interac diagnostics	ZK y functional tion 8. Rand Cluster Meth ZK v used in the ZK ZK ZK Z Ztion 4. Plass and plasma	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator
Nuclear spectroscopy complete voted to fundamentals of 202KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model 02MAT Match M	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetres atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at onte Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in proticle plasma accelerators and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If in injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunchuides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use ogram developm Plasma instabiliti n in plasma wave	eory of the eamm-Danco y methods 1 ect to materia in experime	energy densit ff Approxima 2. Coupled (als frequently ent. Z lasma interac diagnostics i bunches 13. A	zK y functional tion 8. Rand Cluster Meth zK v used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model 02MAT Match Match Model 02MAT Match Model 18MEMC Model 01NEUR1 New Model 18OOP Obtained to the collective consists of the collective consists of the collective collection of the collection	ciclear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-Ford Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetrical streinals for Experimental Nuclear Physics Students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at onte Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning piect Oriented Programming contributions of students concerning given topics concerned on technologies uded in profiticle plasma accelerators cs and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If minjection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunchuides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling Imputer Control of Experiments	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use ogram developm Plasma instabiliti n in plasma wave and transport of	eory of the eamm-Dancol y methods 1 ect to materia in experiment.	as application an application and application application	zK y functional tion 8. Rand Cluster Meth zK v used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Match Match Model O2MAT Match Model O3MEMC Model O3MEMC Model O3MEMC Model O4MEMC Model O5MEMC Model O5MEMC Model O6MEMC Model O7MEMC Model O7	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetres atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at onte Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in proticle plasma accelerators and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. If in injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunchuides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use ogram developm Plasma instabiliti n in plasma wave and transport of	eory of the eamm-Dancol y methods 1 ect to materia in experiment.	as application an application and application application and application appli	zK y functional tion 8. Rand Cluster Meth zK v used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicate
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Mathematical Mathematical Physics, particularly 18MEMC Mothematical Physics, particularly 18MEMC Mothematical Physics devoted to the O1NEUR1 New 1800P Obthis course consists of the CO2LPA Path 1. Introduction to laser physic evolution 5. Methods of bear monitoring 9. Plasma waveg bunches 17PRE Collectures provide information with computers via serial line lectures deal with programming particularly compared to the control of the course of the collectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly compared to the control of the course of the collectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via serial line lectures deal with programming particularly computers via seria	ciclear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic or functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-Ford Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetrical symmetrical for Experimental Nuclear Physics Students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at onte Carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning piect Oriented Programming contributions of students concerning given topics concerned on technologies uded in propertical plasma accelerators cs and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. For injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch uides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling simputer Control of Experiments about standard interfaces of personal computers - parallel, serial, USB, LAN and specters or GPIB (IEEE488) interface, further about measuring systems with VME, VXI and Ling of measuring systems - special dedicated software, problems of use of high programming of measuring systems of use of high programming of mea	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use ogram developm Plasma instabiliti n in plasma wave and transport of ial interface carc XI interfaces, dis ing languages ai	eory of the eamm-Dancol y methods 1 ect to materia in experiment. The each to materia in experiment experiment. The each to materia in experiment experiment experiment.	as application an application and application application and application application and application applic	zK y functional tion 8. Rand Cluster Meth zK v used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicat tages. Next,
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Match Match Model of the collective model O2MAT Match Match Model of the collective model O2MAT Match Match Model of the collective mode	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-Ford Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetres atterials for Experimental Nuclear Physics Students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning protect Oriented Programming contributions of students concerning given topics concerned on technologies uded in protectic plasma accelerators cs and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. In injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch uides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling Imputer Control of Experiments Tabout standard interfaces of personal computers - parallel, serial, USB, LAN and species or GPIB (IEEE488) interface, further about measuring systems with VME, VXI and Ling of measuring systems - special dedicated software, problems of use of high programm liew); data acquisition and evaluation. Finally, students prepare individual software projections.	s in nuclei 3. The ck methods 7. Ta ies in many-bod nysics with respe and possible use ogram developm Plasma instabiliti n in plasma wave and transport of ial interface carc XI interfaces, dis ing languages ai	eory of the eamm-Dancol y methods 1 ect to materia in experiment. The each to materia in experiment experiment. The each to materia in experiment experiment experiment.	as application an application and application application and application application and application applic	zK y functional tion 8. Rand Cluster Meth zK v used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicate tages. Next, d developmen
Nuclear spectroscopy completed to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Mathematical M	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-Ford Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetres atterials for Experimental Nuclear Physics Students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their carlo Method numerical method Monte Carlo and to its selected applications. Fural Networks and their Applications 1 data separation, functional approximation, supervised learning piect Oriented Programming contributions of students concerning given topics concerned on technologies uded in profiticle plasma accelerators cs and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. In injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch uides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling Imputer Control of Experiments Tabout standard interfaces of personal computers - parallel, serial, USB, LAN and species or GPIB (IEEE488) interface, further about measuring systems with VME, VXI and Ling of measuring systems - special dedicated software, problems of use of high programm liew); data acquisition and evaluation. Finally, students prepare individual software projectivity Lie group representations	s in nuclei 3. The ck methods 7. Ta ies in many-bod mysics with respendent of the control of the	eory of the eamm-Dancolly methods 1 ect to materia in experiment. eles, beam-ple 8. Plasma fultrashort beam fultrashort beam despecially isition and element.	as application an application and application	zK y functional tion 8. Rand Cluster Meth zK y used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicate tages. Next, d developmenta
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Mathematical Mathematical Programmits of 3 D2KMP Modern Mode	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Inntum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For footing Properties and influence of the ionizing radiation of symmetres atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in profit plasma accelerators cs and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. In injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch uides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling imputer Control of Experiments about standard interfaces of personal computers - parallel, serial, USB, LAN and species or GPIB (IEEE488) interface, further about measuring systems with VME, VXI and Ling of measuring systems - special dedicated software, problems of use of high prog	s in nuclei 3. The ck methods 7. Ta ies in many-bod mysics with respendence or many-bod mysics with respendence or many-bod mysics with respendence or many-bod many-bod many-bod mysics with respendence or many-bod many-bod mysics in a correspondence or many-bod mysics in many-bod mysics in many-bod mysics with respect to mysics in many-bod mysics with respect mysics with	eory of the eamm-Dancol y methods 1 ect to materia in experiment. The seed to materia in experiment in experiment experiment. The seed to material in experiment ex	as application an application and application application and application and application and application application and application and application and application applicatio	zK y functional tion 8. Rand Cluster Meth zK y used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicat tages. Next, d developmenta 2 pup, matrix Li pring group,
Nuclear spectroscopy complete voted to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Mathematical Mathematical Physics, particularly 18MEMC Mothematical Physics ourse devoted to the O1NEUR1 Networds: Neural networks, 18OOP Obtained Physics of the CO2LPA Pathematical Physics of	ciclear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Idintum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For footion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetres atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction properties and influence of the ionizing radiation on their properties at their construction of their applications. In their construction of their applications of their applications of students concerning given topics concerned on technologies uded in profiticle plasma accelerators In their construction of their applications of plasma and plasma wave generation of their properties and technology, CPA systems 2. Physics of plasma and plasma wave generation of their profiticle plasma accelerators In injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch uides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling imputer Control of Experiments In a particle plasma accelerators of perso	s in nuclei 3. The ck methods 7. Ta ies in many-bod mysics with respendence of the control of th	eory of the earnm-Dancolly methods 1 ect to materia in experiment. eles, beam-ple 8. Plasma fultrashort be established the current states and especially isition and earne, exponent n, irreducibi	as application an application and approximate an application and application and application and application application and application and application and application application and application and application and application a	zk y functional tion 8. Rand Cluster Meth zk y used in the zk	2 in nuclei 4. om Phase od 13. Bohr 2 e experiment: 4 2 2 ma wave accelerator of ultrashort 3 communicat tages. Next, d development 2 pup, matrix L sring group, emma, Weyl'
Nuclear spectroscopy completed to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Mathematical M	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Inntum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For footing Properties and influence of the ionizing radiation of symmetres atterials for Experimental Nuclear Physics students of experimental nuclear physics. The lecture gives the overview of materials properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and influence of the ionizing radiation on their properties and their construction properties and their Applications 1 data separation, functional approximation, supervised learning spect Oriented Programming contributions of students concerning given topics concerned on technologies uded in profit plasma accelerators cs and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. In injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch uides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling imputer Control of Experiments about standard interfaces of personal computers - parallel, serial, USB, LAN and species or GPIB (IEEE488) interface, further about measuring systems with VME, VXI and Ling of measuring systems - special dedicated software, problems of use of high prog	s in nuclei 3. The ck methods 7. Ta ies in many-bod mysics with respendence of the control of th	eory of the earnm-Dancolly methods 1 ect to materia in experiment. eles, beam-ple 8. Plasma fultrashort be seen that it is and especially isition and earne, exponent n, irreducibilities entations of	as application anergy densit ff Approxima 2. Coupled (als frequently ent. Z als frequently ent. Z alsama interact diagnostics a bunches 13. Z andalone equ dvantages a y use of grapl valuation. inisimple grou ial map. 3.Ur lity, reducibili f SO(3) and S	zK y functional tion 8. Rand Cluster Meth zK y used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicate tages. Next, d developmenta 2 bup, matrix Li string group, emma, Weyl' g and lowerin
Nuclear spectroscopy completed to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Materials of 3 Materials of	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Itantum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic r functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For f Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetr Aterials for Experimental Nuclear Physics Students of experimental nuclear physics. The lecture gives the overview of materials physical construction properties and influence of the ionizing radiation on their properties at Onte Carlo Method Carlo	s in nuclei 3. The ck methods 7. Ta ies in many-bod mysics with respendence of the control of th	eory of the earnm-Dancolly methods 1 ect to materia in experiment. eles, beam-ple 8. Plasma fultrashort be seen that it is and especially isition and earne, exponent n, irreducibilities entations of	as application anergy densit ff Approxima 2. Coupled (als frequently ent. Z als frequently ent. Z alsama interact diagnostics a bunches 13. Z andalone equ dvantages a y use of grapl valuation. inisimple grou ial map. 3.Ur lity, reducibili f SO(3) and S	zK y functional tion 8. Rand Cluster Meth zK y used in the zK	2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicate tages. Next, d developmer 2 pup, matrix Li sring group, emma, Weyl' g and lowerin
Nuclear spectroscopy completed to fundamentals of 3 O2KMP Qu. 1. Nuclear Hamiltonian and of Theory of the energy density Approximation 9. Equation of collective model O2MAT Mathematical M	clear Spectroscopy rises several experimental techniques which are of ultimate importance for experimental X- and gamma- ray, charged particle and neutron spectroscopy. Identum Many-Body Problem in the Theory of Atomic Nuclei distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamic of functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-For Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetrical students of experimental nuclear physics. The lecture gives the overview of materials phytheir construction properties and influence of the ionizing radiation on their properties are propertied in their construction properties and influence of the ionizing radiation on their properties are propertied in their construction properties and influence of the ionizing radiation on their properties are propertied in their construction properties and influence of the ionizing radiation on their properties are propertied in the properties and influence of the ionizing radiation on their properties are propertied in the properties and influence of the ionizing radiation on their properties are propertied in the properties and influence of the ionizing radiation on their properties are properties and influence of the ionizing radiation on their properties are properties and influence of the ionizing radiation on their properties are properties and influence of the ionizing radiation on their properties are properties and influence of the ionizing radiation on their properties are properties and influence of the ionizing radiation on their properties are properties and influence of the overview of materials properties are properties and influence of the overview of materials properties are properties and influence of the overview of materials properties are properties and influence of the overview of materials properties are properties and influence of the overview of materials properties are properties and influence of the overview of materi	s in nuclei 3. The ck methods 7. Ta ies in many-bod mysics with respendent of the control of the	eory of the earnm-Dancory methods 1 ect to materia in experiment. eles, beam-ple 8. Plasma fultrashort because their and especially isition and emple and serve, exponent n, irreducibisentations of Stations of Stations of Stations of Stations of Stations.	as application an application an application an application an application an application an application and 2. Coupled (an application and application application and application applicatio	zK y functional tion 8. Rand Cluster Meth zK y used in the zK	acture will be 2 in nuclei 4. om Phase od 13. Bohr 2 e experimenta 4 2 2 ma wave accelerator of ultrashort 3 communicate tages. Next, d developmer 2 pup, matrix Li ering group, emma, Weyl' g and lowerin s, weights an

02ROZ4	Seminar on Quark-Gluon Plasma 4	Z	2
Seminar about rece	nt experimental measurements of the properties of the QGP. Students participate on the seminar by preparing the presentation	about selected pa	pers.
02ROZ5	Seminar on Quark-Gluon Plasma 5	Z	2
Seminar about rece	nt experimental measurements of the properties of the QGP. Students participate on the seminar by preparing the presentation	about selected pa	pers.
02ROZ6	Seminar on Quark-Gluon Plasma 6	Z	2
Seminar about rece	nt experimental measurements of the properties of the QGP. Students participate on the seminar by preparing the presentation	about selected pa	pers.
02SPRA1	Special Practicum 1	KZ	6
•	ont focused on instrumental techniques that are mainly used in physics and technical professions. Topics of each parts are chose of experimental physics and metrology.	en so that students	s can familiarize
02SPRA2	Special Practicum 2	KZ	6
Physics measureme	nt focused on instrumental techniques that are mainly used in physics and technical professions. Topics of each parts are chose	en so that students	s can familiarize
with advanced pats	of experimental physics and metrology.		
01SUP	Start-up Project	KZ	2
01305	otali up i lojoot		
02PRF	Selected topics from probability theory for physicists	Z	2
02PRF Discrete and continu physics, biology and particle production a	1 ,	Z in have long played of neutron cascade	d a major role in les, multiple
02PRF Discrete and continu physics, biology and particle production a	Selected topics from probability theory for physicists ious probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery	Z in have long played of neutron cascade	d a major role in les, multiple
02PRF Discrete and continu physics, biology and particle production a infinitely divisible an 02VPJRS	Selected topics from probability theory for physicists ious probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance.	Z in have long played of neutron cascad y of new classes of	d a major role in les, multiple distributions -
02PRF Discrete and continuous physics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectu	Selected topics from probability theory for physicists lous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wi	d a major role in les, multiple distributions -
02PRF Discrete and continuous physics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectu topics from the physics production and the physics of the simple of the physics of the production of the physics of the production of the physics of t	Selected topics from probability theory for physicists lous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions re is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wingh-energy nuclea	d a major role in es, multiple distributions -
02PRF Discrete and continuous physics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectuotopics from the physical particles and the medium	Selected topics from probability theory for physicists lous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions re is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions of relativistic nucleus-nucleus collisions to the h	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wingh-energy nuclea	d a major role in es, multiple distributions -
02PRF Discrete and continue physics, biology and particle production a infinitely divisible and 02VPJRS The aim of the lectuotopics from the physical substitution of the medium	Selected topics from probability theory for physicists lous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions re is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions of relativistic nucleus-nucleus collisions to the holdscription using a hydrodynamic approach. Moreover, the in-medium parton energy loss and a related concept of the jet quence.	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wingh-energy nuclea	d a major role in es, multiple distributions -
02PRF Discrete and continu physics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectu topics from the phys well as the medium will be complemente 02VS2	Selected topics from probability theory for physicists you probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions re is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions of relativistic nucleus-nucleus collisions. The focus will be put on thermodynamic and statistical physics applications to the hidescription using a hydrodynamic approach. Moreover, the in-medium parton energy loss and a related concept of the jet quenced with computational exercises.	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wi nigh-energy nuclea ching will be discus	d a major role in es, multiple distributions - 3 Il cover selected r collisions, as used. The course
02PRF Discrete and continuphysics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectutopics from the physwell as the medium will be complemente 02VS2 Abstract: Students v	Selected topics from probability theory for physicists you probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions re is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions of relativistic nucleus-nucleus collisions. The focus will be put on thermodynamic and statistical physics applications to the hidescription using a hydrodynamic approach. Moreover, the in-medium parton energy loss and a related concept of the jet quenced with computational exercises. Workshop 2	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wi nigh-energy nuclea ching will be discus	d a major role in es, multiple distributions - 3 Il cover selected r collisions, as used. The course
02PRF Discrete and continuphysics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectutopics from the physwell as the medium will be complemente 02VS2 Abstract: Students v	Selected topics from probability theory for physicists yous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distable distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions re is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions for relativistic nucleus-nucleus collisions. The focus will be put on thermodynamic and statistical physics applications to the highescription using a hydrodynamic approach. Moreover, the in-medium parton energy loss and a related concept of the jet quence and with computational exercises. Workshop 2 Workshop 5 F, where they will present results obtained during the work on their bachelor thesis. During	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wi nigh-energy nuclea ching will be discus	d a major role in es, multiple distributions - 3 Il cover selected r collisions, as used. The course
02PRF Discrete and continu physics, biology and particle production a infinitely divisible an 02VPJRS The aim of the lectu topics from the phys well as the medium will be complemente 02VS2 Abstract: Students v and staff, they will a 02VS3	Selected topics from probability theory for physicists you probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their original economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery distable distributions, which are currently widely used in physics and finance. Selected topics from relativistic nucleus-nucleus collisions are is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions for relativistic nucleus-nucleus collisions. The focus will be put on thermodynamic and statistical physics applications to the hidescription using a hydrodynamic approach. Moreover, the in-medium parton energy loss and a related concept of the jet quence and with computational exercises. Workshop 2 Workshop 5 Workshop 7 Workshop 7 F, where they will present results obtained during the work on their bachelor thesis. During so get familiar with scientific topics developed at the department and with methods other colleagues use for their scientific work.	Z in have long played of neutron cascad y of new classes of Z,ZK ons. The course wi high-energy nuclea ching will be discus Z g other presentation C Z	d a major role in es, multiple distributions - 3 II cover selected r collisions, as seed. The course

List of courses of this pass:

Name of the course

Completion Credits

Code

Practical application of mathematical modeling methods, statistics and machine learning needs wide range of tasks from data preparation and collection to design of an appropria method and its division into units for development and implementation into the production. Last, but not least, the cooperation in group and management of a modern data project crucial. The actual standard of required tools will be presented on lectures. Further, these procedures will be applied during exercises with an emphasis on team collaboration, project in the course, students will present their results to other teams. O1NEUR1 Networks and their Applications 1 ZK 2 Reywords: Neural networks, data separation, functional approximation, supervised learning Start-up Project KZ 2 O2ACF1 Astroparticle physics 1 ZK 2 Outline of the lecture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) 3. Energy spectrum the cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expension, Heliter-Matthews more superposition model) 6. Composition of cosmic radiation (properties, open problems) 7. Spreading of cosmic radiation (expension, Heliter-Matthews more superposition model) 6. Composition of cosmic radiation (experiments, coveriew) 10. Optic detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 22. Detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of undural particles in the cosmic radiation date (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (acrivation) and surface) 4. Astroparticle physics 2 Outline of the lecture: 1. Detection of neutral particles in the cosmic radiation (acrivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and K	0000	Trains of the course	oompionen.	0.00.00
method and its division into units for development and implementation into the production. Last, but not least, the cooperation in group and management of a modern data project crucial. The actual standard of required tools will be presented on lectures. Further, these procedures will be applied during exercises with an emphasis on team collaboration, projections. O1NEUR1	01DAS	Data science	KZ	3
OTNEUR1 Neural Networks and the heir Applications 1 ZK 2 Neural Networks and the heir Applications 1 ZK 2 Neural Networks and their Applications 2 ZK 2 Neural Networks and their Applications 2 ZK 2 Neural Networks and their Applications 2 ZK 2 Neural Networks	Practical applicati	ion of mathematical modeling methods, statistics and machine learning needs wide range of tasks from data preparation and collecti	on to design of an a	appropriate
planning. At the end of the course, students will present their results to other teams. O1NEUR1 Networks and their Applications 1 ZK 2 Reywords: Neural Networks, data separation, functional approximation, supervised learning O1SUP Start-up Project KZ 2 O2ACF1 Astroparticle physics 1 XK 2 Outline of the lecture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) S. Benergy spectrum ecosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expansion, Heitler-Matthews more superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation (experiments, which is superposition model) 8. Sources of cosmic radiation (exotic sources, acceleration mechanisms) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optice teletection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction 12. Detection of neutral particles in the cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theoric, Cascade equation, simulation of showers of cosmic radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments) 10. Detection of neutrinos (principle experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic between detection of neutral and charged particles) O2AQCD Applied Quantum chromodynamics at High Energies ZK 2 Standard model of particle physics is one of the most successful physical theories. It describ	method and its di	vision into units for development and implementation into the production. Last, but not least, the cooperation in group and manageme	nt of a modern dat	a project is
Neural Networks and their Applications 1 Keywords: Neural networks, data separation, functional approximation, supervised learning O1SUP Start-up Project Astroparticle physics 1 Outline of the lecture: 1. History of astroparticle physics 2: Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) 3. Energy spectrum he cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expansion, Heitler-Matthews more superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation (experiments, overview) 10. Optic letection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction 12. Detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction 12. Detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (gradiation (aparima rays (principles, experiments)) O2ACF2 Astroparticle physics 2 Dutline of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effe experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theoric Casacae equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on-public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos	rucial. The actual	standard of required tools will be presented on lectures. Further, these procedures will be applied during exercises with an emphasis	on team collabora	ition, projec
New ords: Neural networks, data separation, functional approximation, supervised learning O1SUP Start-up Project Astroparticle physics 1 Outline of the lecture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) 3. Energy spectrum the cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expansion, Heitler-Matthews more superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation and gamma rays through the space (interaction, magnetic fields) 8. Sources of cosmic radiation (experiments, overview) 10. Optical election of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (experiments) 12. Detection of gamma rays (principles, experiments) O2ACF2 Dutline of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effe experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theor to universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinas (flauber's model, Gribov-Regge theor to universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinas flat stage		planning. At the end of the course, students will present their results to other teams.		
O1SUP Start-up Project KZ 2 02ACF1 Astroparticle physics 1 Outline of the lecture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) 3. Energy spectrum he cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expension, Heitler-Matthews more superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation and gamma rays through the space (interaction, magnetic fields) 8. Sources of cosmic radiation (experiments, experiments) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optic detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (properties, experiments) 12. Detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction 12. Detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction 12. Detection of showers of cosmic radiation (types of detectors, reconstruction 12. Detection of neutral particles in the cosmic radiation (and an (and properties) and properties) and the lecture: 1. Detection of neutral particles in the cosmic radiation (and (ancutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effective experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theory universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principles experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic betwe	01NEUR1	Neural Networks and their Applications 1	ZK	2
O2ACF1 Astroparticle physics 1 Outline of the lecture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) 3. Energy spectrum he cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (experiments) 7. Spreading of cosmic radiation (experiments, osuperposition model) 6. Composition of cosmic radiation (experiments, results, open problems) 7. Spreading of cosmic radiation and gamma rays through the space (interaction, magnetic fields) 8. Sources of cosmic radiation (exotic sources, acceleration mechanisms) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optic-letection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of gamma rays (principles, experiments) O2ACF2 Astroparticle physics 2 Outline of the lecture: 1. Detection of neutral particles in the cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theore). Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of reviral provided interactions (Glauber's model, Gribov-Regge theore) (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic between detection of neutral and charged particles) O2AQCD Applied Quantum Chromodynamics that corresponds to understanding of the dynamics of processes in particle physics at high energing in proton and nuclear targets t		Keywords: Neural networks, data separation, functional approximation, supervised learning		
Outline of the lecture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary problems) 3. Energy spectrum he cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expansion, Heitler-Matthews more superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation (expansion, Heitler-Matthews more superposition model) 8. Sources of cosmic radiation (experiments, overview) 10. Optical etection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction 12. Detection of gamma rays (principles, experiments) O2ACF2	01SUP	Start-up Project	KZ	2
he cosmic radiation (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expansion, Heitler-Matthews more superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation and gamma rays through the space (interaction, magnetic fields) 8. Sources of cosmic radiation (exotic sources, acceleration mechanisms) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optical detection of showers of cosmic radiation (experiments, overview) 10. Optical detection of showers of cosmic radiation (types of detectors, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of gamma rays (principles, experiments) O2ACF2	02ACF1	Astroparticle physics 1	ZK	2
superposition model) 6. Composition of cosmic radiation (types of measurements, results, open problems) 7. Spreading of cosmic radiation and gamma rays through the space (interaction, magnetic fields) 8. Sources of cosmic radiation (exotic sources, acceleration mechanisms) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optical detection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of gamma rays (principles, experiments) O2ACF2 Outline of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effe experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theor universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic between detection of neutral and charged particles) O2AQCD	Outline of the lect	ture: 1. History of astroparticle physics 2. Introduction to astronomy (scales, observation windows, types of objects, contemporary pro	blems) 3. Energy s	pectrum of
(interaction, magnetic fields) 8. Sources of cosmic radiation (exotic sources, acceleration mechanisms) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optical election of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of gamma rays (principles, experiments) O2ACF2 Duttine of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effective experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theoris, Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic between detection of neutral and charged particles) O2AQCD	ne cosmic radiatio	on (properties, spectral index, age) 4. Direct detection of cosmic radiation (experiments, findings) 5. Showers of cosmic radiation (expa	nsion, Heitler-Matth	news model
(interaction, magnetic fields) 8. Sources of cosmic radiation (exotic sources, acceleration mechanisms) 9. Indirect detection of cosmic radiation (experiments, overview) 10. Optical letection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 12. Detection of gamma rays (principles, experiments) O2ACF2 Dutline of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effective experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theoris, Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic particles) O2AQCD				
letection of showers of cosmic radiation (fluorescence and cherenkov techniques, reconstruction) 11. Surface detection of showers of cosmic radiation (types of detectors, reconstruction) 2. Detection of gamma rays (principles, experiments) O2ACF2				
12. Detection of gamma rays (principles, experiments) O2ACF2				•
Astroparticle physics 2 Outline of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effet experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theore, Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connection between detection of neutral and charged particles) O2AQCD		· · · · · · · · · · · · · · · · · · ·	00 01 001001010, 100	orioti dotiori
Outline of the lecture: 1. Detection of neutral particles in the cosmic radiation data (neutrons, photons, neutrinos) 2. Radio detection of showers of cosmic radiation (Askaryan's effet experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theoric Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connectic between detection of neutral and charged particles) O2AQCD	02ACE2		7K	2
experiments) 3. Detection and use of secondary mions from cosmic radiation (accelerators, tomography) 4. Models of hadronic interactions (Glauber's model, Gribov-Regge theors, Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connection between detection of neutral and charged particles) O2AQCD		· · · ·		_
5. Cascade equation, simulation of showers of cosmic radiation (derivation, algorithms) 6. Hands-on public astroparticle data (fits data, Auger and KASCADE data) 7. Evolution of universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principle experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connection between detection of neutral and charged particles) O2AQCD			•	-
universe (introduction to cosmology, relict radiation) 8. Nuclear processes in stars (nuclear synthesis, creation of neutrinos, final stages of stars) 9. Detection of neutrinos (principles experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connection between detection of neutral and charged particles) O2AQCD		, , , , , , , , , , , , , , , , , , , ,		• • • • • • • • • • • • • • • • • • • •
experiments, proton decay, double beta decay) 10. Detection of gravitational waves (principles, experiments) 11. Dark matter (theory, experiments) 12. Multimessengers (connection between detection of neutral and charged particles) O2AQCD	•		•	
between detection of neutral and charged particles) O2AQCD Applied Quantum Chromodynamics at High Energies ZK 2 This lecture is oriented to provide basic applications of quantum chromodynamicks that corresponds to understanding of the dynamics of processes in particle physics at high energency proton and nuclear targets that are currently measured by experiments at RHIC and LHC colliders. Complementary informations to lectures of Basics of quantum chromodyname will be provided. O2BSM Physics beyond the Standard Model Z 2 Standard model of particle physics is one of the most successful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an estrong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1 Master Thesis 1 Z 10	•			
This lecture is oriented to provide basic applications of quantum chromodynamicks that corresponds to understanding of the dynamics of processes in particle physics at high energy on proton and nuclear targets that are currently measured by experiments at RHIC and LHC colliders. Complementary informations to lectures of Basics of quantum chromodynam will be provided. O2BSM Physics beyond the Standard Model Standard model of particle physics is one of the most successful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an estrong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1 Master Thesis 1 Z 10	experiments, proto		wuitimessengers (connections
This lecture is oriented to provide basic applications of quantum chromodynamicks that corresponds to understanding of the dynamics of processes in particle physics at high energy on proton and nuclear targets that are currently measured by experiments at RHIC and LHC colliders. Complementary informations to lectures of Basics of quantum chromodynam will be provided. O2BSM Physics beyond the Standard Model Standard model of particle physics is one of the most successful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an strong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1 Master Thesis 1 Z 10	02AQCD	Applied Quantum Chromodynamics at High Energies	ZK	2
will be provided. O2BSM Physics beyond the Standard Model Standard model of particle physics is one of the most successful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an strong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1 Master Thesis 1 Z 10	his lecture is orie		article physics at hi	igh energies
02BSM Physics beyond the Standard Model Standard model of particle physics is one of the most succesful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an estrong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1 Master Thesis 1 Z 10	n proton and nuc	lear targets that are currently measured by experiments at RHIC and LHC colliders. Complementary informations to lectures of Basic	s of quantum chror	nodynamics
Standard model of particle physics is one of the most succesful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an strong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1		will be provided.	•	•
Standard model of particle physics is one of the most succesful physical theories. It describes the elementary particles which form the matter and their electromagnetic, weak an strong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1	02BSM	Physics beyond the Standard Model	Z	2
strong interactions. It is however an incomplete theory and there are several questions which it can not answer. The goal of the lecture is to review the missing points in the Standard model and show potential directions where the new physics beyond the Standard model could be found. O2DPJC1	Standard model		ir electromagnetic,	weak and
model and show potential directions where the new physics beyond the Standard model could be found. 02DPJC1 Master Thesis 1 Z 10			•	
		·	31	
he master thesis is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project supervisor during comm	02DPJC1	Master Thesis 1	Z	10
	he master thesis	is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the pro-	ect supervisor duri	na commor
regular meetings and discussions.		1 11 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		5

			,
02DPJC2	Master Thesis 2	Z	20
The master thesis is	s based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the proj regular meetings and discussions.	ect supervisor duri	ing common
02EXSH	Extreme States of Matter	ZK	2
Lectures will provid	e basics in states of matter in extreme conditions. It deals with broad spectra of phenomena from electromagnetic plasma through ph	nases of nuclear m	atter at high
-	ensities to highly speculative forms of matter that may be responsible for initialy accelerated expansion of the Universe in its early sta- celeration (dark energy). Lectures may also serve as a brief introduction to parts of modern cosmology connected to nuclear and pa		or its current
02FAJ	Physics of Atomic Nuclei	ZK	4
,	N) interaction, few-body systems, G matrix, nuclear properties, nuclear models (single-particle model, collective motion, Hartree-Foc	• • •	
02FUJS	Physics of Ultrarelativistic Nuclear Collisions	ZK	2
	eject is to introduce students the principles of physics of heavy-ion collisions at large energies. Students will gain insight into phases of		
_	er (quark-gluon plasma (QGP)), probes which contain information about the QGP and other phases of the collision, and knowledge the based on the recent measurements at present experiments.		
02GTR	General Theory of Relativity	Z,ZK	4
	the basics of General Relativity theory as well as its applications, mainly in cosmology. The students will get acquainted with the starti	,	al Relativity.
The course inclu	des the explanation of necessary mathematics: differential geometry. Classic results are derived, like the precession of Mercury, grav	ritational frequency	shift and
gravitational bendin	ng of light. The participants learn about Schwarzschild metrics and its solution leading to black holes. In the application part the Friedn is introduced and dynamics of the Universe is discussed.	nan-Robertson-Wa	alker metrics
02JSP	Nuclear Spectroscopy	Z,ZK	5
Nuclear spectrosco	opy comprises several experimental techniques which are of ultimate importance for experimental nuclear physics and various applic devoted to fundamentals of X- and gamma- ray, charged particle and neutron spectroscopy.	ations as well. Led	ture will be
02KMP	Quantum Many-Body Problem in the Theory of Atomic Nuclei	ZK	2
-	onian and distinguishing the degrees of freedom within nuclei 2. Collective and one-body dynamics in nuclei 3. Theory of the energy		
Theory of the ene	ergy density functional for the excited states 5. Selfconsistent mean-field model 6. Post Hartree-Fock methods 7. Tamm-Dancoff Appr	oximation 8. Rando	om Phase
Approximation 9. E	Equation of Motion Phonon Method 10. Generator Coordinate Method 11. Restoration of symmetries in many-body methods 12. Coul collective model	pled Cluster Metho	od 13. Bohr
02KTPA1	Quantum Field Theory 1	Z,ZK	8
	to introduce the students to both fundamental and applied parts of quantum field theory. The focus is in particular on equations of rela	,	nechanics,
canonical quantizat	ion of scalar and bispinor field, perturbation theory (Feynman's rules) and basics of renormalization. The content of the lecture can se	erve as a base for f	urther study
	in fields of exactly solvable models, theory of critical phenomena, molecular chemistry and biochemistry or quantum gravity		
02KTPA2	Quantum Field Theory 2	Z,ZK	8
	at introducing the students to the Feynman's functional integral and its applications. The focus is on broadening the knowledge of mo	· ·	
HOH-TEIAUVISUC C	quantum field theory and statistical physics. The content of the lecture can serve as a base for further study in fields of exactly solvab	ie models, meory d	oi citticai
	phenomenal molecular chemistry and biochemistry or quantum gravity		
USI DV	phenomena, molecular chemistry and biochemistry or quantum gravity. Particle plasma accelerators	7K	2
02LPA	Particle plasma accelerators	ZK interaction 4. Plas	2 sma wave
1. Introduction to		interaction 4. Plas	ma wave
Introduction to evolution 5. Method	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma	interaction 4. Plas stics and plasma a	sma wave accelerator
Introduction to evolution 5. Methor monitoring 9. Plas	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnoma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches	interaction 4. Plas stics and plasma a s 13. Application of	sma wave accelerator f ultrashort
1. Introduction to evolution 5. Metho monitoring 9. Plas	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnous waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics	interaction 4. Plas stics and plasma a s 13. Application of ZK	sma wave accelerator f ultrashort
1. Introduction to evolution 5. Methomonitoring 9. Plas 02MAT This lecture is designated as a second content of the content	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequence.	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the e	sma wave accelerator f ultrashort
1. Introduction to evolution 5. Methor monitoring 9. Plas 02MAT This lecture is designated in the second content of the second co	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivuclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment.	ma wave accelerator f ultrashort 2 experimental
1. Introduction to evolution 5. Methomonitoring 9. Plas 02MAT This lecture is designed on the common of the commo	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivuclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment.	ma wave accelerator f ultrashort 2 experimental
1. Introduction to evolution 5. Methomonitoring 9. Plas 02MAT This lecture is designed on the common of the commo	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivuclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment.	ma wave accelerator f ultrashort 2 experimental
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed on O2MTD Lectures will cover	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivalear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern of undersonated in the properties and possible use in construction, ways of using and constrains. Emphasis is given also to electronic detector control and voltage suppliers.	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials use	ma wave accelerator f ultrashort 2 experimental 2 sed for their
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designated of the control of the	Particle plasma accelerators laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivuclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment.	ma wave accelerator f ultrashort 2 experimental 2 sed for their
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is designed of the plant of th	Particle plasma accelerators It laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma and so of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivalear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors, ways of using and constrains. Emphasis is given also to electronic detector control and voltage suppliers. Selected topics from probability theory for physicists	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment actions and zero zero zero zero zero zero zero zero	ma wave accelerator f ultrashort 2 experimental 2 sed for their 2 najor role in
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed of the plant of the p	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma add of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction and voltage suppliers. Selected topics from probability theory for physicists nuous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin he and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment acts and played and fineutron cascades	ma wave accelerator f ultrashort 2 experimental 2 sed for their 2 najor role in s, multiple
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed of the production of the evolution o	Particle plasma accelerators It leaser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma and so of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction and voltage suppliers. Selected topics from probability theory for physicists Buous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin head and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance.	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used long played and fineutron cascades new classes of dissessions.	ma wave accelerator f ultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions -
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed of the continuous of the continu	Particle plasma accelerators It leads of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction and voltage suppliers. Selected topics from probability theory for physicists unous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin has and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment are considered as for entron cascades new classes of disserties.	ma wave accelerator f ultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions -
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed of the production of the produc	Particle plasma accelerators It laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma and so of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivulear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors. Selected topics from probability theory for physicists usous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin had and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are current	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used long played and fineutron cascades new classes of dis group, factor group	ma wave accelerator f ultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions -
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is designed of the production of the prod	Particle plasma accelerators It laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma and so of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Selected topics from probability theory for physicists unous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin had and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations metric group	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used long played and fineutron cascades new classes of discrete Z group, factor group. 3. Universal cover	ma wave accelerator f ultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group,
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is designed of the production of the prod	Particle plasma accelerators Alaser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma add of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequenclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Selected topics from	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK extors, materials used in the experiment are long played and fineutron cascades new classes of discounty. Z group, factor group as 3.Universal covercibility, Schur's lem	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, nma, Weyl's
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed in the continuous of the contin	Particle plasma accelerators It laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma and so of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Selected topics from probability theory for physicists unous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin had and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations metric group	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment are long played and fineutron cascades new classes of discounty as 3. Universal covercibility, Schur's lend SU(2), raising as	ama wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group, nma, Weyl's and lowering
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed in the continuous of the contin	Particle plasma accelerators Alaser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnoma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Selected topics from probability theory for physicists unous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin had and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations meetric group, Po	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment are long played and fineutron cascades new classes of discounty as 3. Universal covercibility, Schur's lend SU(2), raising as	ama wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group, nma, Weyl's and lowering
1. Introduction to evolution 5. Methomonitoring 9. Plas O2MAT This lecture is designed in the continuous of the contin	Particle plasma accelerators Itaser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma add of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequinclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction and voltage suppliers. Selected topics from probability theory for physicists uous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin had and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment are long played and fineutron cascades new classes of discounty as 3. Universal covercibility, Schur's lend SU(2), raising as	arma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group, nma, Weyl's and lowering
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is designed and conting the physics, biology a particle production O2REP 1. Group theory, syr groups, SO(n), St relation between St theorem. 5. Lie algel operators, spin reprince of the physics o	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma add of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnor ma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivalely their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors of using and constrains. Emphasis is given also to electronic detector control and voltage suppliers. Selected topics from probability theory for physicists and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description on and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations materic group, homomorphism, isomorphism, group action, direct product, semidirect product, normal group, simple and semisimple U(n), Lorentz group, Poincaré group. 2.One-parameter group, Lie algebras, Lie group – Lie algebra correspondence, exponential map (3) and SU(2). 4.Representation theory, unitary representation, regular representation, equivalent representation, irreducibility, redults the propersentation and their connection to Lie group representation, pro	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK exteriors, materials used in the experiment and successive states of discovering the states of the sta	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers.
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is designed of the continuous of the cont	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma ods of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnorma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivelear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors onstruction, ways of using and constrains. Emphasis is given also to electronic detector control and voltage suppliers. Selected topics from probability theory for physicists usous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin has and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of an and the spread of infectious diseases. The generalization of these properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations metric group, homomorphism, isomorphism, group action, direct product, semidirect product, normal group, simple and semisimple U(n), Lorentz group, Poincaré group. 2.One-parameter group, Lie algebras, Lie group – Lie algebra correspondence, exponential map (2), and SU(2). 4.Representation theory, unitary representation, projective representation. 6.Irreducible representations of SO(3) a resentation. 7.Fi	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK exteriors, materials used and for exercises of discovered as a second of the experiment of the experiment.	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, ma, Weyl's and lowering weights and 2 apers. 2
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is designed of the continuous of the cont	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma add of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnoma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequiclear physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors. Selected topics from probability theory for physicists uous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin had economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description on and the spread of infectious diseases. The generalization of these distributions has later on led t	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK exteriors, materials used and for exercises of discovered as a second of the experiment of the experiment.	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers. 2
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is design on the continuous of the continu	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagno ma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in physics. Selected topics from probability theory for physicists usous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin he and economics. The	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used and for experiment are stored as a stored a	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers. 2 apers. 2 apers.
1. Introduction to evolution 5. Methor monitoring 9. Plas O2MAT This lecture is design on the continuous of the continu	Particle plasma accelerators I laser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma add of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagno ma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunche bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequivaled properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors, ways of using and constrains. Emphasis is given also to electronic detector control and voltage suppliers. Selected topics from probability theory for physicists uous probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin have an another of the further expansion of these divisions in the 20th century was their application to the description of an and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group representations Matrix Lie group, homomorphism, isomorphism, group action, direct product, semidirect product, normal group, simple and s	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used and for experiment are stored as a stored a	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers. 2 apers. 2 apers.
1. Introduction to evolution 5. Methoromotioning 9. Plas O2MAT This lecture is designated in the continuous of the cont	Particle plasma accelerators I aser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnosma waveguides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches bunches Materials for Experimental Nuclear Physics Materials for Experimental Nuclear Physics Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors. Selected topics from probability theory for physicists Selected topics from probability theory for physicists and economics. The impetus for the further expansion of these divisions in the 20th century was their application to the description of and the spread of infectious diseases. The generalization of the properties of these distributions has later on led to the discovery of infinitely divisible and stable distributions, which are currently widely used in physics and finance. Matrix Lie group, Pomomorphism, isomorp	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used and played a normal fineutron cascades new classes of discontinuity. Schur's lemind SU(2), raising a sell-Mann matrices, and about selected particular and surface and the selected particular and surface and surf	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 pp, matrix Lie ring group, ma, Weyl's and lowering weights and 2 apers. 2 apers. 2 apers. 2 apers.
1. Introduction to evolution 5. Methoromonitoring 9. Plas O2MAT This lecture is designed in the production of the produ	Particle plasma accelerators I aser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnor may wave guides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle probability theory for physicists Selected topics from probability theory for physicists sucus probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin hand experimental interpretations (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin hand experimental for inf	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment. Z ave long played a not fine the fine fine fine fine fine fine fine fin	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers. 2 apers. 2 apers. 2 apers. 2 apers. 2 apers.
1. Introduction to evolution 5. Methoromonitoring 9. Plas O2MAT This lecture is designed in the control of the	Particle plasma accelerators Itaser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnost of ode of plasma wave 9. Plasma diagnost of plasma of plasma wave 9. Plasma diagnost of plasma 4. Plasma 5. Plasma 4. Plasma 6. Plasma 6	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment. Z ave long played a not neutron cascades new classes of discontinuous dil	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers. 2 apers. 2 apers. 2 apers. 2 apers. 2 momentum
1. Introduction to evolution 5. Methoromonitoring 9. Plas O2MAT This lecture is designed in the control of the	Particle plasma accelerators I aser physics and technology, CPA systems 2. Physics of plasma and plasma wave generation 3. Plasma instabilities, beam-plasma dos of beam injection to plasma wave 6. Ultrashort particle bunch generation 7. Dynamics of bunch in plasma wave 8. Plasma diagnor may wave guides 10. Plasma charged particle optics 11. Ultrashort bunch diagnostics 12. Handling and transport of ultrashort bunches Materials for Experimental Nuclear Physics gned for students of experimental nuclear physics. The lecture gives the overview of materials physics with respect to materials frequencies physics, particularly their construction properties and influence of the ionizing radiation on their properties and possible use in Modern Detectors all types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle physics. Topics include principles of construction of particular types of detectors used in modern nuclear and particle probability theory for physicists Selected topics from probability theory for physicists sucus probability distributions (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin hand experimental interpretations (Binomial, Poisson, negative binomial, normal, etc.) as well as the processes that lead to their origin hand experimental for inf	interaction 4. Plas stics and plasma as 13. Application of ZK ently used in the experiment. ZK ectors, materials used in the experiment. Z ave long played a not neutron cascades new classes of discontinuous dil	ma wave accelerator fultrashort 2 experimental 2 sed for their 2 major role in s, multiple stributions - 2 p, matrix Lie ring group, nma, Weyl's and lowering weights and 2 apers. 2 apers. 2 apers. 2 apers. 2 momentum

02SE1	Seminar 1	Z	3		
The aim of the se	eminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fields research tasks and diploma theses of their colleagues. Participants will be informed about recent results in particle physic		studied in		
02SE2	Seminar 2	Z	3		
The aim of the se	eminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fields		studied in		
	research tasks and diploma theses of their colleagues. Participants will be informed about recent results in particle physic				
02SE3	Seminar 3	Z	3		
I he aim of the se	eminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fields research tasks and diploma theses of their colleagues. Participants will be informed about recent results in particle physic		studied in		
02SE4	Seminar 4	7	3		
	eminar is that students get familiar with basics skills to present the own scientific results. Students get also knowledge from the fields	of particle physics	_		
	research tasks and diploma theses of their colleagues. Participants will be informed about recent results in particle physic				
02SPRA1	Special Practicum 1	KZ	6		
Physics measuren	nent focused on instrumental techniques that are mainly used in physics and technical professions. Topics of each parts are chosen s	so that students car	familiarize		
00000040	with advanced pats of experimental physics and metrology.	147			
02SPRA2	Special Practicum 2 nent focused on instrumental techniques that are mainly used in physics and technical professions. Topics of each parts are chosen s	KZ	6		
Friysics measuren	with advanced pats of experimental physics and metrology.	o triat studerits car	i iaiiiiiaiize		
02SZD1	Statistical Data Analysis 1	Z,ZK	4		
	marily focused on practical application of methods of experimental data analysis. Students obtain knowledge of different statistical me		-		
	ng of hypothesis. The course quickly recapitulates basis of mathematical probability theory but it is recommended to attend a full course				
02SZD2	Statistical Data Analysis 2	Z,ZK	4		
Individual student's	s work will include implementation and testing of a program for analysis of generated data sample. Background understanding of Mor	ite Carlo generators	for hadron		
collision will be e	explained. The course covers methods of data smearing and subsequent deconvolution of data. Basics understanding and usage of n	eural networks and	machine		
001104	learning will be covered.	71/			
02UC1	Particles Accelerators 1 Introduction to physics and technology of classical (electrostatic and radiofrequency) particle accelerators.	ZK	2		
02UC2	Particle Accelerators 2	ZK	2		
02002	Introduction to physics and technology of modern and next generation accelerators based on laser and plasma technology	1	2		
02VPJRS	Selected topics from relativistic nucleus-nucleus collisions	Z,ZK	3		
	ture is to discuss in more depth the physics of the extreme state of the nuclear matter created in relativistic nucleus-nucleus collisions.	1 ' 1	er selected		
	hysics of relativistic nucleus-nucleus collisions. The focus will be put on thermodynamic and statistical physics applications to the high				
well as the mediun	n description using a hydrodynamic approach. Moreover, the in-medium parton energy loss and a related concept of the jet quenching	y will be discussed.	The course		
001/00	will be complemented with computational exercises.				
02VS2	Workshop 2 will participate on annual Workshop J F, where they will present results obtained during the work on their bachelor thesis. During oth	Z	nm etudonte		
	and staff, they will also get familiar with scientific topics developed at the department and with methods other colleagues use for their staff, they will also get familiar with scientific topics developed at the department and with methods other colleagues use for their staff.		iii students		
02VS3	Workshop 3	Z	1		
	will participate on annual Workshop J F, where they will present results obtained during the work on their bachelor thesis. During oth	er presentations fro	m students		
ar	nd staff, they will also get familiar with scientific topics developed at the department and with methods other colleagues use for their s	cientific work.			
02VUJC1	Research Project 1	Z	6		
The research proje	ect is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the pro	ject supervisor duri	ng common		
200/11/100	regular meetings and discussions.	1/7			
02VUJC2	Research Project 2 ect is based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the pro	KZ	8		
The research proje	regular meetings and discussions.	ject supervisor dum	ing continuon		
02ZELW	Introduction to Theory of Electroweak Interactions	Z,ZK	6		
	e lectures is to acquire knowledge about theory of weak interaction from Fermi theory of -decay, introduction of charged intermediate				
electromagnetic a	and weak interaction in the framework of Standard model including Higgs mechanism. Short student presentations dedicated to expense	rimental discoveries	related to		
	the topics covered in the lectures (such as first measurements of W and Z gauge bosons, Higgs boson discovery) are envision	1			
02ZQCD	Quantum Chromodynamics	Z,ZK	6		
_	lectures is to acquire knowledge about basic principles of strong interaction starting from the constituent quark model and SU(3) flavous				
Structure in deep in	nelastic scattering of leptons on nucleons and parton model to basics of Quantum Chromodynamics and its practical applications in the in high energy physics and physics of ultra-relativistic heavy-ion collisions.	context of current e	xperiments		
17PRE	Computer Control of Experiments	Z,ZK	3		
	nformation about standard interfaces of personal computers - parallel, serial, USB, LAN and special interface cards; about standalone	1 1			
with computers via serial lines or GPIB (IEEE488) interface, further about measuring systems with VME, VXI and LXI interfaces, discuss their advantages and disadvantages. Next,					
lectures deal with programming of measuring systems - special dedicated software, problems of use of high programming languages and especially use of graphical oriented development					
	s (Agilent VEE ane LabView); data acquisition and evaluation. Finally, students prepare individual software project for data acquisition				
18MEMC	Monte Carlo Method This courseis devoted to the numerical method Monte Carlo and to its selected applications.	Z,ZK	4		
19000		Z			
1800P	Object Oriented Programming This course consists of the contributions of students concerning given topics concerned on technologies uded in program development.	1	2		
1	III. III. III. III. III. III. II	· - · · · · · · · · · · · · · · · · · ·			

For updated information see http://bilakniha.cvut.cz/en/FF.html Generated: day 2024-05-20, time 22:34.