Study plan

Name of study plan: Fyzika a technika termojaderné fúze

Faculty/Institute/Others: Department: Branch of study guaranteed by the department: Welcome page Garantor of the study branch: Program of study: Applications of Natural Sciences Type of study: Follow-up master full-time Required credits: 91 Elective courses credits: 29 Sum of credits in the plan: 120 Note on the plan:

Name of the block: Compulsory courses of the specialization Minimal number of credits of the block: 91 The role of the block: PO

Code of the group: NMSFTTFPP1 Name of the group: NMSFTTF - povinné p edm ty 1. ro ník Requirement credits in the group: In this group you have to gain at least 51 credits Requirement courses in the group: In this group you have to complete at least 13 courses Credits in the group: 51 Note on the group:

Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their Completion Credits Code Scope Semester Role members) Tutors, authors and guarantors (gar.) Atomic and Molecular Physics 02AMF Z,ZK 2+27 4 PO David B e David B e (Gar.) **Plasma Diagnostics** 02DPLA 3 L Z,ZK 2+1PO Karel ezá , Pavel Kubeš, Daniel Klír Daniel Klír Karel ezá (Gar.) **Inertial Fusion Physics** 12FIF Ζ Z,ZK 4 3+1 PO Ond ej Klimo Ond ej Klimo Ond ej Klimo (Gar.) Physics of Tokamaks 02FT Z,ZK 4 3+1 Ζ PO Ond ej Ficker Jan Mlyná (Gar.) **Materials Science for Reactors** 14NMR ΖK 2 1P+1C 6 PO Petr Haušild Petr Haušild Petr Haušild (Gar.) Computer Modelling of Plasma 02PMPL 3 Z,ZK 2+1 L PO Radek Plašil Radek Plašil (Gar.) Laboratory Work in Plasma Physics 1 7 Ζ 2 02PRPL1 0+2PO Jana Brotánková Vojt ch Svoboda (Gar.) Laboratory Work in Plasma Physics 2 02PRPL2 K7 2 0+2 L PO Jana Brotánková, Vojt ch Svoboda Jana Brotánková Vojt ch Svoboda (Gar.) **Technology of Thermonuclear Facilities** 02TTJZ L 7K 3 3+0 Ond ej Klimo, Ond ej Ficker, Radomír Pánek, Ivan uran, Michal Farník, PO Slavomír Entler Slavomír Entler (Gar.) **Plasma Theory 1** 02TPLA1 Z.ZK 7 5 2+2PO Petr Kulhánek Jan Mlyná Petr Kulhánek (Gar.) **Plasma Theory 2** L 02TPLA2 Z,ZK 5 3+1 PO Petr Kulhánek Jan Mlyná Jan Mlyná (Gar.) **Research Project 1** 02VUTF1 Ζ 6 Z,L 6 PO Jana Brotánková **Research Project 2** 02VUTF2 ΚZ 8 8 L,Z PO Daniel Klír, Jana Brotánková, Vojt ch Svoboda, Ivan uran, Monika Vilémová, Libor Juha, Jakub Svoboda, Miroslav Kr s, Ond ej Kudlá ek, ... Ivan

Characteristics of the courses of this group of Study Plan: Code=NMSFTTFPP1 Name=NMSFTTF - povinné p edm ty 1. ro ník

02AMF	Atomic and Molecular Physics	Z,ZK	4				
This lecture course prov	rides a theoretical introduction to atomic and molecular physics.						
02DPLA	Plasma Diagnostics	Z,ZK	3				
he goal of the lecture is	he goal of the lecture is to obtain the overview of measurements of basic parameters of hot plasma and their components - density, temperature, electromagnetic fields, radiation and						
energy and temporal an	d spatial distribution. The students will acquaint with principles, methodic, demonstration, examples and application of basic	diagnostics.					

12FIF Inertial Fusion Physics	Z,ZK	4					
These lectures aim to introduce to the topic of inertial confinement fusion (ICF). Physical processes, which take place during the individual stages before and after ignition of the fuel							
are discussed. The problems (instabilities etc.), which make the inertial confinement and the ignition of the fuel more demanding are discussed and their potential solutions are presented.							
New projects in the field of ICF including some preliminary reactor designes are reviewed.							
02FT Physics of Tokamaks	Z,ZK	4					
Advanced course on physics of thermonuclear fusion in the magnetic confinement of tokamaks. The course is focused on the physics context, terminological sectors and the physics context, terminological sectors and the physics are set of the physics the physics ar	ogy and pheno	menology of the					
subject so that students can substantially improve their understanding of physics background as well as their capacity to search for information and to wo	rk independen	tly with scientific					
literature.							
14NMR Materials Science for Reactors	ZK	2					
Materials for classical and fusion reactors							
02PMPL Computer Modelling of Plasma	Z,ZK	3					
The goal of the lecture is to acquaint the students with basic methods of computer modelling in physics and to apply these techniques to the study of ph	nysical process	es in both					
low-temperature and high-temperature plasmas.							
02PRPL1 Laboratory Work in Plasma Physics 1	Z	2					
The goal of the lecture is performing experimental work on advanced plasma laboratory experiments: either on a fusion device - the GOLEM tokamak, or	or in a specializ	ed laboratory					
for training of fusion oriented plasma physics - PlasmaLab@CTU. The goal is also obtaining experience with the basics of scientific work.							
02PRPL2 Laboratory Work in Plasma Physics 2	KZ	2					
The goal of the lecture is performing experimental work on advanced plasma laboratory experiments: either on a fusion device - the GOLEM tokamak, or	or in a specializ	ed laboratory					
for training of fusion oriented plasma physics – PlasmaLab@CTU. The goal is also obtaining experience with the basics of scientific work.							
02TTJZ Technology of Thermonuclear Facilities	ZK	3					
The course introduces students to the basic technologies of thermonuclear devices. The aim of the course is to provide students with basic technical inf	formation for th	eir future work					
on fusion experimental facilities. The course provides an overview of solutions, technical problems, possibilities and limits of fusion equipment operation	I.						
02TPLA1 Plasma Theory 1	Z,ZK	5					
The first part of the lecture will be devoted to the individual particles motion in Lagrange and Hamilton formalism for both relativistic and non-relativistic t	behavior. The p	article drifts will					
be solved in the frame of adiabatic approach. The second part of the lecture will be devoted to magnetohydrodynamics, especially such phenomena as	helicity and he	lical structures,					
magnetic field-lines reconnection, MHD dynamo and others.							
02TPLA2 Plasma Theory 2	Z,ZK	5					
First part of the lecture will be devoted to plasma waves and instabilities. General recipes of obtaining the disperse relation will be discussed, especially	linearization a	nd Fourier					
transform. Magnetoacoustic waves, electromagnetic waves, and basic instabilities will be treated in detail. The second part of the lecture will be devoted	to statistical pla	asma approach,					
e. g. transport phenomena, and microinstabilities such as Landau damping.							
02VUTF1 Research Project 1	Z	6					
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 proj	ject supervisor	during common					
regular meetings and discussions.							
02VUTF2 Research Project 2	KZ	8					
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 proj	ject supervisor	during common					
regular meetings and discussions.							

Code of the group: NMSFTTFPP2

Name of the group: NMSFTTF - povinné p edm ty 2. ro ník

Requirement credits in the group: In this group you have to gain at least 40 credits

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

Credits in the group: 40

Note on the group:

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
02DPTF1	Master Thesis 1 Jan Horá ek Vojt ch Svoboda (Gar.)	Z	10	10	Z,L	PO
02DPTF2	Master Thesis 2 Ivan uran	Z	20	20	L,Z	PO
12FLP	Physics and Human Cognition Vojt ch Svoboda	Z	2	2+0	L	PO
02ITER	ITER and the Accompanying Programme Jan Mlyná	ZK	3	2+0	Z	PO
01MMNS	Mathematical Modelling of Non-linear Systems Michal Beneš Michal Beneš Michal Beneš (Gar.)	ZK	3	1P+1C	Z	PO
02PINC	Pinches Daniel Klír	ZK	3	2+0	Z	PO
02STF1	Seminar FTTF1 Jan Mlyná	Z	2	0+2		PO
02STF2	Seminar FTTF2 Jan Mlyná	Z	3	0+2		PO

Characteristics of the courses of this group of Study Plan: Code=NMSFTTFPP2 Name=NMSFTTF - povinné p edm ty 2. ro ník 02DPTF1 Master Thesis 1 Z 10

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The diploma 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.							
02DPTF2	Master Thesis 2	Z	20				
The diploma 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 di	scussions						

12FLP	Physics and Human Cognition	Z	2				
W. Heisenberg said that modern physics is the most important philosophical event of the 20tieth century. This course tries to show "why". It describes the present days picture of the							
universe based on the	universe based on the General theory of relativity and Quantum theory and briefly comments on important milestones of the history of physics and philosophy. It inquires the place of						
the physics and mather	the physics and mathematics in the cultural history of mankind and their influence on the art and discusses some ethical problems of the scientific research.						
02ITER	ITER and the Accompanying Programme	ZK	3				
Students will learn deta	ils on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryo	, plant, nuclear saf	ety, operation				
scenarios, ITER plasma	a diagnostics, schedule of construction and operation. Besides, history of the project, forms of international collaboration, pro	jects IFMIF and D	DEMO as well as				
major fusion research o	entres in the world will be presented.						
01MMNS	Mathematical Modelling of Non-linear Systems	ZK	3				
The course consists of	basic terms and results of the theory of finite- and infinitedimensional dynamical systems generated by evolutionary different	ial equations, and	description of				
bifurcations and chaos.	Second part is devoted to the explanation of basic results of the fractal geometry dealing with attractors of such dynamical s	ystems.					
02PINC	Pinches	ZK	3				
In these lectures the stu	dents will be acquaint with the discharge principle of the generation of the plasma with the high energy density in which the	neutrons are proc	duced. The today				
knowledge of basic res	earch and application are presented and scenario of future evolution is discussed.						
02STF1	Seminar FTTF1	Z	2				
Seminars based on invi	ed lectures given by experts in the field of research and development of thermonuclear fusion. Students are encouraged to par	, ticipate in semina	rs of neigbouring				
fields according to the subject of their diploma thesis.							
02STF2	Seminar FTTF2	Z	3				
Seminars based on invi	ed lectures given by experts in the field of research and development of thermonuclear fusion. Students are encouraged to par	ticipate in semina	rs of neigbouring				
fields according to the s	subject of their diploma thesis.						

Name of the block: Elective courses Minimal number of credits of the block: 0 The role of the block: V

Code of the group: NMSFTTFVP Name of the group: NMSFTTF - volitelné p edm ty Requirement credits in the group: Requirement courses in the group: Credits in the group: 0 Note on the group:

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
12ASF	Astrophysics	ZK	4	2+2	L	V
12DRP	Differential Equations on Computer Richard Liska Richard Liska Richard Liska (Gar.)	Z,ZK	5	2+2	Z	V
16DNEU	Neutron Dosimetry Michal Koš ál, Ond ej Ploc Ond ej Ploc Ond ej Ploc (Gar.)	ZK	2	2+0	3	V
02HSEF	History, Social and Economical Aspects of Fusion	KZ	2	1+0	Z	V
02ZLSTF2	Summer School of Plasma Physics and Fusion Physics 2 Vojt ch Svoboda (Gar.)	Z	1	1týd.	L	V
02NF	Neutron Physics	Z,ZK	4	2+2	L	V
12NIPL	Low Temperature Plasmas and Discharges Jaroslav Nejdl Jaroslav Nejdl Jaroslav Nejdl (Gar.)	Z,ZK	4	4	Z	V
01NSPP	Numerical Simulations of Convection Problems	KZ	2	1+1	L	V
12OPS	Optical Spectroscopy	ZK	2	2+0	L	V
12POEX	Computer Control of Experiments Miroslav ech Miroslav ech Miroslav ech (Gar.)	Z	2	2+0	L	V
12SFMC1	Computer Simulations in Many-particle Physics 1 Milan P edota Richard Liska Richard Liska (Gar.)	Z,ZK	4	3+1	Z	V
12SFMC2	Computer Simulations in Many-particle Physics 2 Milan P edota, Karel Houfek Richard Liska (Gar.)	ZK	2	2+0	L	V
17PRJT	Nuclear Technology Devices	ZK	2	2+0	L	V
16REL	Radiation Effects in Matter Kate ina Pila ová Kate ina Pila ová Kate ina Pila ová (Gar.)	ZK	2	2+0	Z	V
11SUPR	Superconductivity and Low Temperature Zden k Jan , Martin Ledinský Martin Ledinský (Gar.)	ZK	4	4	Z	V
12UM	Introduction to Management Petr Malát Petr Malát Petr Malát (Gar.)	ZK	2	2+0	Z	V
16ZIVO	Introduction to Environment Hana Pr šová Hana Pr šová Hana Pr šová (Gar.)	KZ	2	2+0	1	V
02PMCF	Topics in Magnetic Confinement Fusion Ond ej Ficker Ond ej Ficker (Gar.)	KZ	2	0+2	L	V
12PICF	Inertial Confinement Fusion Daniel Klír, Ji í Limpouch Daniel Klír Ji í Limpouch (Gar.)	KZ	2	2	L	V

B12FB2 Introduction to Computer Security 2 Z 2 1 +1 v 16ZJT Nuclear Technology Devices Somal acids, feed agont Acids Acid	01ZPB1	Introduction to Computer Security 1 Petr Voká Petr Voká Petr Voká (Gar.)	Z	2	1+1		V							
LECUT Nuclear Technology Devices ZK 2 2+0 1 v 022LSTF1 Winter School of Plasma Physics and Fusion Physics 1 Z 1 1tyd. Z v 022LSTF1 Winter School of Plasma Physics and Fusion Physics 1 Z 1 1tyd. Z v 022LSTF1 Winter School of Plasma Physics and Fusion Physics 1 Z 1 1tyd. Z v 022LSTF1 Winter School of Plasma Physics and Fusion Physics and Physics Physics Physics Physics Physics Physics Physics Phys	01ZPB2	Introduction to Computer Security 2	Z	2	1+1		v							
Instruction Up of Newholds (par) In In In In In Characteristics of the courses of this group of Study Plan: Code=NMSFTTFV Name=NMSFTTF - voliteInfo per day to the study and the	16ZJT	Nuclear Technology Devices	ZK	2	2+0	1	V							
T2ASF [Astrophysics ZK 4 tex ecure* target/segurity a continues, operating area of physics, students and feerow and deep mitter understanding of significant segurity differential equations, non-sequence and means and reactions, studied area and segurity and allocation. The differential equations, analysic in frammanic equations, non-sequence and means and the sequence and the sequence and the sequence analysic in the sequence and the sequence analysic in the sequence and the sequence. Laprace analysic in the secuence and the sequence analysic in the sequence and the ses	02ZLSTF1		Z	1	1týd.	Z	V							
T2ASF [Astrophysics] activation of the batic physics courses. In this realizely capibrating area of physics, students will review and deep their underraining of significant segrets of chysics, students will review and deep their underraining of significant segrets of chysics, students will review and deep their underraining of significant segrets of chysics, students will review and deep their understanding of significant segrets of chysics, students will review and deep their analysis. Fair segrets analysis is physically and affective segrets analysis in presentations. The advector segrets and their advectors. The different segrets advectors and the segret advectors. The segret advectors advectors advectors advectors advectors advectors and the sector advectors advectors. The segret advectors adv	Characteristics of the	e courses of this group of Study Plan: Code=NMSFTTFVP Name	e=NMSFTTF	- voliteln	é pedm	ty								
The because Autorphysic ¹ is a commutation of the basic physics outries, in this relatively capital meday, natation, and more, but an archenice, capital, the meday capital meday, natation, and more, but a methods, subject, periodic autors, market and methods, Methany effective and the subject of the physics, subject on the physics and the subject of the physics and the subject on the subject of the physics. The subject of the physics and the subject on the subject on the subject of the physics. The subject of the physics and the subject of the physics and the subject on the subject on the subject on the subject on the subject of the subject of the subject on the subject o							4							
12DRP Differential Equations on Computer 2.ZK 5 Contrary differential equations, navies, methods; Contrary differential equations, numerical exclutor, hinks afterence and exclutor, analytic, paratolic consultors, baseling; consequences, conservation, base and their numerical activation, shalls water equations, Lister equations, Listerequations, Lister equations, Lister equations, Liste	The lecture "Astrophysics" is	a continuation of the basic physics courses. In this relatively captivating area of physic	s, students will re	view and de	1	1	of significant							
Contany afferential equisitions, analytical methods: Contany afferential equations, manetical methods, Runge-Kutta methods, Stability, Franz Lagrangian methods, ALE methods, Parcel equations, Lainer equations, Lagrangian methods, ALE methods, Parcel equations, Lainer equations, Lagrangian methods, ALE methods, Parcel equations, Lainer equations, Lagrangian methods, ALE methods, Parcel Par					7	74	5							
particultion of eliptic equations, proceedines of differential equations, Partial differential equations, numerical solution, Theire difference enterines, conterior approximation, Lager methods, ALEs methods, Practical computation in Mattal system for numerics and Maple for analysis of schemes. IEDNEU Neutron Desiminity ZK 2 Neutron Personal International Control Sight method, neutron solutions, Tablew water equations. Laure methods, Restore and the control and the contrel and the control and the control		· ·	methods stability	· Partial diff		<i>'</i>	-							
stability, convergence, modified equation, diffusion, and Sape to any Sate Array and Sat	1		-											
methods: Plancial Computation in Mattice system for numerics and Maple for analysis of schemes. 2 2 Methods based on nuclear reactions with neutrons, methods based on recoaled nuclei, the time of flight method, neutron selectors and monochamicin, passithe of analysis of schemes and other does and does reits measuring interuments. 2 Vibile a special factor, Stocial and E concornical Asposto of Fusion KZ 2 Wibiles a special factor activity in specifystic on induce on methods, anteriod on neuron domeses are discussed. 2 1 OZ2LSTEZ Summer School of Plasma Physics and Fusion Physics 2 Z 1 Regular international Subard Summer School of Plasma Physics and Fusion Physics 2 Z/LK 4 Basic properties of neutron, relations, fusion, neutron detection, neutron inducer reactivity, fusion inducer and table on the second in a community. Inducer and table in the second inducer and table and table is under to induce reactivity. OZINF Neutron Physics Z 4 Basic properties of neutron, relation detection, neutron inducer reactivity. Z/LK 4 Anime collision phenometry including in collision and school in the inducer and table in a collision, phenometry inducer and table inducer and table in analysis on and collision phenometry. Z/LK 4 Collision phenometry inducer and table inducer and table inducer and table ind	1 · · · ·													
Naterods based on nuclear reactors with neutrons, methods based on recolud quele, the time of fight method roution allectors and the reastmements. CHSEF History, Social and Economical Appends of Fusion KZ 2 White a special team can fit on aligned to aller on observe to methods, m			·		. ,	0 0	,							
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IDENSEF History, Social and Economical Aspects of Fusion KZ 2 While a scoial event as thom simple to complex. Form kown to new, the incure processity or surprising errors and billind aliger. Course brings out place of fusion in community, including horizon and the roy of stratum on the true post-astic stratum. History: Earlier and the stratum in the logic movement of the post-astic stratum. Z 1 Regular international: "Student Student Student Parsens and Fusion Physics' and Fusion Physics' and editors. Z 1 Regular international: "Student Student Parsens and Fusion Physics' and Fusion Physics' and editors, neutron detection, neutro			eutron selectors a	nd monochi	1	1	ods, methods							
While a special locure acts from simpler to complex, from known to may, this fecture proceeds from older to later. It connects fastion and the authors, Lectures explain the logic movement of the research of controlled fusion in future power mix. At locures are discussed. C2LLSTE2 Summer School of Plasma and Fusion Physics and Pusion Physics 2 Z 1 Regular international "Student Summer School of Plasma and Fusion Physics and Pusion Physics 2 Z 1 Regular international "Student Summer School of Plasma and Fusion Physics and Pusion Physics 2 Z 1 Regular international "Students authors reductions interves, accelerator based neutron sources, nuclear treasmort- nautron induced readers. Insuion, neutron treasmort, neutron shelding, physicat principles of nuclear treasmort-interescing in the students, reduction gas in electric fields. Steep resperites of nuclear treasmort-interescing in the students, reduction gas in electric fields. Steep resperites on the steep resperites on the steep resperites in the steep resperites on the steep respective. The steep respective respective presents and nucleon steep respective. The steep respective respective presents and nucleon steep respective respective presents and nucleon steep respective. The steep respective respective presents and nucleon respective presents and nucleon steep respective presents. The steep respective present steep respectin the steep respectin the steep respective present	of integrating neutron dosime	etry, possibilities of use of various methods, calibration of neutron dosimeters and othe	er dose and dose	rate measu	ring instrume	ents.								
While a special fecture acts from simpler to complex, from known to new, this fecture proceeds from older to later. It connects fusion examplement and figures with is authors. Lectures explain the bigor movement of the requisance holds on tables of fusion in forum power mix. At lectures are fusion news are discussed. OZLSTE Summer School of Plasma and Fusion Physics and Fusion Physics 2 I C 1 Regular international "Student Summer School of Plasma Physics and Fusion Physics 2 I C 1 Regular international Summer School of Plasma and Fusion Physics and Fusion Physics 2 I C 1 Regular international Student Summer School of Plasma and Fusion Physics and Fusion Physics 2 I C 2	02HSEF His	story, Social and Economical Aspects of Fusion				KZ	2							
including function of the popularization and the role of fusion in future power mix. At learners are discussed. Image: C2LS TEP Summer School of Plasma and Fusion Physics 2 Z 1 Regular international "Student Summer School of Plasma and Fusion Physics 3 Z 1 Regular international "Student Summer School of Plasma and Fusion Physics 3 Z.2K 4 Basic properties of enderty notices, ancelerate based neutron sources, nuclear research reactors, neutron induced reactors, fission, neutron fiscilon, physical principles of nuclear facilities for energy production. Z.2K 4 Atomic collision pharonena, basic concepts and relations, elastic scattering, ionization and excitation; three-particle recombination. Brehmsstrahlung; radiative capture; line radiation. Processess in particular jonzed gas. D.2. and A.C. elastic field. Blasmathemest and blasmathemes			t connects fusion	arrangemer	nt and figure	s with its auth	nors. Lectures							
Image: Internet School of Plasma Physics and Fusion Physics 2 I Regular international "Student Summer School of Plasma and Fusion Physics" should help students to improve their communication skills. Each participanting student presents a talk on his research. ZZK 4 D2NF Neutron Physics ZZK 4 Basks properties of neutron, radion detection, neutron detection, detectio	explain the logic movement	of the research of controlled fusion reaction, including necessary or surprising errors a	nd blind alleys. Co	ourse brings	s out place o	f fusion in co	ommunity,							
Regular international "Subder Summer School of Plasma and Fusion Physics" should help students to improve their communication skills. Each participating student presents a talk on his research, madron skills. Each participating student presents a talk on his research. O2NF Neutron Physics Z,ZK 4 Basic proprites of neutron instancia with match, slowing down and absorption of neutrons, macroscopic description of neutron transport, neutron shielding, physical principation diverse facilities for energy production. Z,ZK 4 Atomic collision phenomena: basic concepts and relations: elastic scattering; ionization and excitation: three-particle recombination. Brehmsstrahlung, rediative capture, line radiation. Z,ZK 4 Atomic collision phenomena: basic concepts and relations: elastic scattering; ionization and excitation: three-particle recombination. Brehmsstrahlung, rediative capture, line radiation. Click and the capture internation and relations. Z/ZK 4 Atomic collision phenomena: basic concepts and relations: elastic scattering; ionization and excitation: three-particle recombination. Brehmsstrahlung, rediative capture, line radiation. Z/ZK 4 Atomic collision phenomena: basic concepts and relations: elastic scattering; ionization and excitation: three-particle recombination. Brehmsstrahlung, rediative capture; line radiation. Z/ZK 4 Collision Phenomena: basic device in 20 col 3. Col Convector Problems KZ 2 2 2 2 <td>including function of the pop</td> <td>ularization and the role of fusion in future power mix. At lectures are fusion news are d</td> <td>iscussed.</td> <td></td> <td></td> <td></td> <td></td>	including function of the pop	ularization and the role of fusion in future power mix. At lectures are fusion news are d	iscussed.											
Regular international "Student Summer School of Plasma and Fusion Physics" should heip students to improve their communication skills. Each participating student presents a talk on his research. ZZK 4 C2NF Neutron Physics ZZK 4 Basic progenities of neutron, stimulation with matter, slowing down and absorption of neutrons, macroscopic description of neutron transport, neutron shielding, physical principles of nuclear facilities for energy production. ZZK 4 Common presentation in the action with matter, slowing down and absorption of neutrons, macroscopic description of neutron transport, neutron shielding, physical principles of nuclear facilities for energy production. ZZK 4 Atomic collision phenomena, basic concepts and relations; leasts exattering: contrading gas in electric field. Phenomenan on electrodes. Electrical probes. Collision phenomena, basic concepts and relations; desite scattering: contrading gas in their modynamic equilture. In collaring gas in electric field. Phenomenan on electrodes. Electrical probes. Coll SC / 2 Students will be acqualited with the 2D and 3D numerical simulations of flow problems described by potential, inviscid and viscous flow. It is a transport flow simulation are also mentioned. ZZ / 2 Z 12OPS Optical Spectroscopy ZK 2 2 12DPEX Computer Simulations in Many-particle Physics 1 Z 2 12POEX Computer Simulations in Many-particle Physics 1 Z	02ZLSTF2 Su	mmer School of Plasma Physics and Fusion Physics 2				Z	1							
O2NF Neutron Physics Z.ZK 4 Basic properties of neutron, radionuclide neutron sources, accelerator based neutron sources, nuclear research reactors, neutron induced reactions, fission, neutron detection, neutron diffractor, neutron induced neutron sources, nuclear research reactors, neutron induced reactions, fission, neutron diffractor, neutron diffract			eir communicatior	skills. Eacl	n participatir	ig student pre	esents a talk							
Easis properties of neutron, radionalidie neutron sources, accelerator based neutron sources, nuclear research neators, neutron induced reactions, fission, neutron detection, neutron 12NIPL Low Temperature Plasmas and Discharges Z,K 4 Admin collision phenomena, basic concepts and relations; dissic statisting, ionization and excitation; three-particle recombination. Brehmsstrahlum; radiative capture; line radiation. Processes in partially ionized gas. Case in thermodynamic edischarge Low Texpesure discharge with heated cathods. Electrical probes. OthSPP Numerical Simulations of Convection Problems KZ 2 Students with be acquainted with the 2D and 3D material simulations. To flow problem described by potential, inviscid and viscous flow. It is a transmich flow around a with profile, in a 2D and 3D channels of different shape, in the boundary layer, and in the modeling of cardiovascular problems. Some cases of turbulent flow simulations are also mentioned. Z 2 12OPS Optical Spectroscopy ZK 2 2 Introduction. Basic design of computer. Control of Experiments Computer Simulations of S, multitaking, multusen, Basic theory of control systems. Programming languages for control (assembler, C, etc.). Introduction to TCPIP protocols. Control of experiments is internet. Z 2 12OPS Optical Spectroscopy ZK 4 12POEX Computer Simulations in Many-particle Physics 1 Z	on his research.													
Easte properties of neutron, radionuclide neutron sources, accelarator based neutron sources, nuclear research reactors, neutron induced reactions, fission, neutron detection, neutron Idiraction, neutron interaction with matter, slowing down and absorption of neutrons, macroscopic description of neutron strangont, neutron shielding, physical principles of nuclear facilities for energy production. Z,ZK 4 Advinci collision phenomena, basic concepts and relations, slaxies cattering, ionization and excitation; three-particle recombination. Brehmsstrahlung; radiative capture; line radiation. Processes in partially ionized gas. Gas in thermodynamic edicharge Lev Developmenta on electrodes. Breakdown of gas in D.C. and A.C. electric fields. Gas dicharges: Lev Developmenta on electrodes. Breakdown of gas in D.C. and A.C. electric fields. Gas dicharges: Lev Developmenta on electrodes. Breakdown of gas in D.C. and A.C. electric fields. Gas dicharges: Lev Developmenta on electrodes. Breakdown of gas in D.C. and A.C. electric fields. Gas dicharges: Lev Developmenta on electrodes. Breakdown of gas in D.C. and A.C. electric fields. Gas dicharges: Lev Developmenta electric field in Developmenta on electrodes. Breakdown of gas in D.C. and A.C. electric fields. Gas dicharges: Lev Developmenta electrone problems. KZ 2 Students will be acquainted with the 2D and 3D nutrical simulations of flow problems described by potential, invisicial and viscous flow. It is a transmotic flow around a wing profile, in a 2D and 3D lattice, in 2D and 3D lattice. Term developmenta electrone flow problems on the modeling of cardiovascular problems. Some cases of turbulent flow simulations are also menintome. 12DOEX <td< td=""><td>02NF Ne</td><td>eutron Physics</td><td></td><td></td><td>Z</td><td>,ZK</td><td>4</td></td<>	02NF Ne	eutron Physics			Z	,ZK	4							
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02PMCF	Topics in Magnetic Confinement Fusion	KZ	2			
This course provides an opportunity to students interested in magnetic confinement fusion to enhance their knowledge of fusion physics and technology by special topics that are not						
covered by the mainstream courses. At the same time, it is a platform where students can meet young research scientists from the COMPASS tokamak. In the end of the course						
students are expected to	o present results of their own research task.					
12PICF	Inertial Confinement Fusion	KZ	2			
Main lecture goal is to a	cquaint students with certain detailed theoretical and experimental methods that have not been taught in subject FIF (Physic	s of Inertial Fusio	n).			
01ZPB1	Introduction to Computer Security 1	Z	2			
01ZPB2	Introduction to Computer Security 2	Z	2			
16ZJT	Nuclear Technology Devices	ZK	2			
Basic scheme of nuclea	r reactor and nuclear power plant, chain fission reaction development, factors influencing reactivity, internal fuel cycle, main o	components of nu	clear energetic			
reactor, most important	reactor types, linear high-voltage accelerators, linear high-frequency accelerators, accelerators based on cyclotron, microtro	n, betatron, electr	on and proton			
synchrotrons, electron a	and ion sources for accelerators, targets.					
02ZLSTF1	Winter School of Plasma Physics and Fusion Physics 1	Z	1			
Regular international "Student Winter School of Plasma and Fusion Physics" should help students to improve their communication skills. Each participating student presents a talk on						
his research.						

List of courses of this pass:

	Name of the course	Completion	Credits
01MMNS	Mathematical Modelling of Non-linear Systems	ZK	3
The course consists	of basic terms and results of the theory of finite- and infinitedimensional dynamical systems generated by evolutionary differential ed	quations, and des	scription of
bifurcatio	ons and chaos. Second part is devoted to the explanation of basic results of the fractal geometry dealing with attractors of such dyna	mical systems.	
01NSPP	Numerical Simulations of Convection Problems	ΚZ	2
Students will be acqu	uainted with the 2D and 3D numerical simulations of flow problems described by potential, inviscid and viscous flow. It is a transonic f	low around a wir	ng profile, in
a 2D and 3D lattice,	, in 2D and 3D channels of different shape, in the boundary layer, and in the modeling of cardiovascular problems. Some cases of tur also mentioned.	bulent flow simul	lations are
01ZPB1	Introduction to Computer Security 1	Z	2
01ZPB2	Introduction to Computer Security 2	Z	2
02AMF	Atomic and Molecular Physics	Z,ZK	4
02/ 1011	This lecture course provides a theoretical introduction to atomic and molecular physics.	2,210	
02DPLA	Plasma Diagnostics	Z.ZK	3
-	is to obtain the overview of measurements of basic parameters of hot plasma and their components - density, temperature, electron	,	-
•	d temporal and spatial distribution. The students will acquaint with principles, methodic, demonstration, examples and application of I	•	
02DPTF1	Master Thesis 1	7	10
-	s based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project		
	regular meetings and discussions.		ng commo
02DPTF2	Master Thesis 2	Z	20
-	s based on a topic approved by the administrators of the programme, department and by the dean. The student is guided by the project		_
	regular meetings and discussions.		
02FT	Physics of Tokamaks	Z.ZK	4
	physics of thermonuclear fusion in the magnetic confinement of tokamaks. The course is focused on the physics context, terminology	,	•
		, and phonomon	ology of the
subject so that studen	nts can substantially improve their understanding of physics background as well as their capacity to search for information and to work	independently w	ith scientific
subject so that studer	nts can substantially improve their understanding of physics background as well as their capacity to search for information and to work literature.	independently w	ith scientific
	literature.		
02HSEF	literature. History, Social and Economical Aspects of Fusion	KZ	2
02HSEF	literature.	KZ res with its autho	2 rs. Lectures
02HSEF	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu	KZ res with its autho	2 rs. Lectures
02HSEF While a special lectur explain the logic mo	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed.	KZ res with its autho ce of fusion in co	2 rs. Lectures ommunity,
02HSEF While a special lectur explain the logic mo 02ITER	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme	KZ res with its autho ce of fusion in co ZK	2 rs. Lectures ommunity, 3
02HSEF While a special lectur explain the logic mo 02ITER Students will learn o	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed.	KZ res with its autho ce of fusion in co ZK it, nuclear safety,	2 ors. Lectures ommunity, 3 operation
02HSEF While a special lectur explain the logic mo 02ITER Students will learn o	literature. literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla Including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme details on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryoplan	KZ res with its autho ce of fusion in co ZK it, nuclear safety,	2 ors. Lectures ommunity, 3 operation
02HSEF While a special lectur explain the logic mo 02ITER Students will learn o	literature. literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme details on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryoplar ma diagnostics, schedule of construction and operation. Besides, history of the project, forms of international collaboration, projects major fusion research centres in the world will be presented.	KZ res with its autho ce of fusion in co ZK it, nuclear safety,	2 ors. Lectures ommunity, 3 operation
02HSEF While a special lectur explain the logic mo 02ITER Students will learn o scenarios, ITER plase 02NF	literature. literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme details on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryoplar ma diagnostics, schedule of construction and operation. Besides, history of the project, forms of international collaboration, projects major fusion research centres in the world will be presented. Neutron Physics	KZ res with its autho ce of fusion in co ZK it, nuclear safety, IFMIF and DEMC Z,ZK	2 rs. Lectures pommunity, 3 operation D as well as 4
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02HSEF While a special lectur explain the logic mo 02ITER Students will learn o scenarios, ITER plass 02NF Basic properties of ne diffraction, neutron i 02PINC	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out pla including function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme details on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryoplar ma diagnostics, schedule of construction and operation. Besides, history of the project, forms of international collaboration, projects major fusion research centres in the world will be presented. Neutron Physics eutron, radionuclide neutron sources, accelerator based neutron sources, nuclear research reactors, neutron induced reactions, fission interaction with matter, slowing down and absorption of neutrons, macroscopic description of neutron transport, neutron shielding, pr facilities for energy production. Pinches students will be acquaint with the discharge principle of the generation of the plasma with the high energy density in which the neutror	KZ res with its autho ce of fusion in co ZK it, nuclear safety, IFMIF and DEMO Z,ZK n, neutron detect nysical principles ZK	2 rs. Lectures ommunity, 3 operation D as well as 4 ion, neutron of nuclear 3
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02HSEF While a special lecture explain the logic model 02ITER Students will learn of scenarios, ITER plass 02NF Basic properties of need iffraction, neutron i 02PINC In these lectures the scourse provides covered by the mail	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu ovement of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out platincluding function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme details on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryoplar ma diagnostics, schedule of construction and operation. Besides, history of the project, forms of international collaboration, projects major fusion research centres in the world will be presented. Neutron Physics eutron, radionuclide neutron sources, accelerator based neutron sources, nuclear research reactors, neutron induced reactions, fission interaction with matter, slowing down and absorption of neutrons, macroscopic description of neutron transport, neutron shielding, principles for energy production. Pinches Students will be acquaint with the discharge principle of the generation of the plasma with the high energy density in which the neutror knowledge of basic research and application are presented and scenario of future evolution is discussed. Topics in Magnetic Confinement Fusion an opportunity to students interested in magnetic confinement fusion to	KZ res with its autho ce of fusion in co ZK it, nuclear safety, IFMIF and DEMO Z,ZK n, neutron detect nysical principles ZK ons are produced KZ by special topics k. In the end of th	2 rs. Lectures ommunity, 3 operation D as well as 4 ion, neutron of nuclear 3 d. The today 2 that are not be course
02HSEF While a special lecture explain the logic model 02ITER Students will learn of scenarios, ITER plass 02NF Basic properties of need iffraction, neutron i 02PINC In these lectures the scores provides covered by the mail 02PMCF	literature. History, Social and Economical Aspects of Fusion re acts from simpler to complex, from known to new, this lecture proceeds from older to latter. It connects fusion arrangement and figu overment of the research of controlled fusion reaction, including necessary or surprising errors and blind alleys. Course brings out platincluding function of the popularization and the role of fusion in future power mix. At lectures are fusion news are discussed. ITER and the Accompanying Programme details on the ITER basic parameters and components of ITER: the superconducting magnets, vacuum pumping, fuel cycle, cryoplar ma diagnostics, schedule of construction and operation. Besides, history of the project, forms of international collaboration, projects major fusion research centres in the world will be presented. Neutron Physics eutron, radionuclide neutron sources, accelerator based neutron sources, nuclear research reactors, neutron induced reactions, fission interaction with matter, slowing down and absorption of neutrons, macroscopic description of neutron transport, neutron shielding, pr facilities for energy production. Pinches students will be acquaint with the discharge principle of the generation of the plasma with the high energy density in which the neutron knowledge of basic research and application are presented and scenario of future evolution is discussed. Topics in Magnetic Confinement Fusion an opportunity to	KZ res with its autho ce of fusion in co ZK it, nuclear safety, IFMIF and DEMC Z,ZK n, neutron detect nysical principles ZK ons are produced KZ by special topics c. In the end of th Z,ZK	2 rs. Lectures ommunity, 3 operation D as well as 4 ion, neutron of nuclear 3 d. The today 2 that are not ie course 3

02PRPL1	Laboratory Work in Plasma Physics 1	Z	2
	Laboratory work in Flasma Flysics 1 ecture is performing experimental work on advanced plasma laboratory experiments: either on a fusion device - the GOLEM tokamak,	1	1
The goal of the le	for training of fusion oriented plasma physics – PlasmaLab@CTU. The goal is also obtaining experience with the basics of scienti		laboratory
02PRPL2	Laboratory Work in Plasma Physics 2	KZ	2
I he goal of the le	ecture is performing experimental work on advanced plasma laboratory experiments: either on a fusion device - the GOLEM tokamak,		laboratory
	for training of fusion oriented plasma physics - PlasmaLab@CTU. The goal is also obtaining experience with the basics of scienti		
02STF1	Seminar FTTF1	Z	2
Seminars based or	n invited lectures given by experts in the field of research and development of thermonuclear fusion. Students are encouraged to particip	bate in seminars of	neigbouring
	fields according to the subject of their diploma thesis.		1
02STF2	Seminar FTTF2	Z	3
Seminars based or	n invited lectures given by experts in the field of research and development of thermonuclear fusion. Students are encouraged to particip	pate in seminars of	neigbouring
	fields according to the subject of their diploma thesis.		
02TPLA1	Plasma Theory 1	Z,ZK	5
The first part of the	e lecture will be devoted to the individual particles motion in Lagrange and Hamilton formalism for both relativistic and non-relativistic l	behavior. The partic	cle drifts will
be solved in the fra	ame of adiabatic approach. The second part of the lecture will be devoted to magnetohydrodynamics, especially such phenomena as	helicity and helical	l structures,
	magnetic field-lines reconnection, MHD dynamo and others.		
02TPLA2	Plasma Theory 2	Z,ZK	5
First part of the	lecture will be devoted to plasma waves and instabilities. General recipes of obtaining the disperse relation will be discussed, especia	ally linearization an	d Fourier
	oacoustic waves, electromagnetic waves, and basic instabilities will be treated in detail. The second part of the lecture will be devoted	-	
	e. g. transport phenomena, and microinstabilities such as Landau damping.		
02TTJZ	Technology of Thermonuclear Facilities	ZK	3
	uces students to the basic technologies of thermonuclear devices. The aim of the course is to provide students with basic technical in	1	-
	fusion experimental facilities. The course provides an overview of solutions, technical problems, possibilities and limits of fusion equip		
02VUTF1	Research Project 1	Z	6
	ect is 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	
		1/7	0
02VUTF2	Research Project 2	KZ	8
I ne 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 proj	ect supervisor duri	ing common
	regular meetings and discussions.		
02ZLSTF1	Winter School of Plasma Physics and Fusion Physics 1	Z	1
Regular internation	nal "Student Winter School of Plasma and Fusion Physics" should help students to improve their communication skills. Each participa	ting student preser	nts a talk on
	his research.		
02ZLSTF2	Summer School of Plasma Physics and Fusion Physics 2	Z	1
Regular internatio	nal "Student Summer School of Plasma and Fusion Physics" should help students to improve their communication skills. Each partici	pating student pres	sents a talk
	on his research.		
11SUPR	Superconductivity and Low Temperature	ZK	4
The subject of cou	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr	roscopic quantum p	phenomena
The subject of cou	Superconductivity and Low Temperature	roscopic quantum p	phenomena
The subject of cou	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr s (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff	roscopic quantum p	phenomena
The subject of cou in quantum fluids 12ASF	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr s (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor.	fects, Coulomb bloc	ckade and
The subject of cou in quantum fluids 12ASF	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr s (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics	fects, Coulomb bloc	ckade and
The subject of cou in quantum fluids 12ASF The lecture "Astrop	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr is (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more.	oscopic quantum p fects, Coulomb bloo ZK eir understanding c	phenomena ckade and 4 of significant
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr as (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer	oscopic quantum p fects, Coulomb bloo ZK eir understanding c Z,ZK	phenomena ckade and 4 of significant 5
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP Ordinary differentia	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr s (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer al equations, analytical methods; Ordinary differential equations, numerical methods, Runge-Kutta methods, stability; Partial differential equations	in coscopic quantum proscopic quantum processor coulomb block bloc	phenomena ckade and d of significant 5 s, hyperbolik,
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP Ordinary differentia parabolic and ellipt	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr is (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer al equations, analytical methods; Ordinary differential equations, numerical methods, Runge-Kutta methods, stability; Partial differential equations, numerical solution, finite difference methods, difference sc	coscopic quantum p fects, Coulomb bloo ZK eir understanding c Z,ZK equations, analysis themes, order of ap	henomena ckade and 4 of significant 5 s, hyperbolik, proximation,
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP Ordinary differentia parabolic and ellipt	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macristics is (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer al equations, analytical methods; Ordinary differential equations, numerical methods, Runge-Kutta methods, stability; Partial differential equations, posedness of differential equations; Partial differential equations, numerical solution, finite difference methods, difference scence, modified equation, diffusion, dispersion; Conservation laws and their numerical solution, shallow water equations, Euler equations	coscopic quantum p fects, Coulomb bloo ZK eir understanding c Z,ZK equations, analysis themes, order of ap	henomena ckade and 4 of significant 5 s, hyperbolik, proximation,
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP Ordinary differentia parabolic and ellipt stability, converge	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr s (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer al equations, analytical methods; Ordinary differential equations, numerical methods, Runge-Kutta methods, stability; Partial differential equations, posedness of differential equations; Partial differential equations, numerical solution, finite difference methods, difference science, modified equation, diffusion, dispersion; Conservation laws and their numerical solution, shallow water equations, Euler equation methods; Practical computation in Matlab system for numerics and Maple for analysis of schemes.	in a conscopic quantum processopic quantum processopic quantum processop of the constraint of the cons	henomena ckade and 4 of significant 5 s, hyperbolik, proximation, thods, ALE
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP Ordinary differentia parabolic and ellipt stability, converge 12FIF	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macristics is (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer al equations, analytical methods; Ordinary differential equations, numerical methods, Runge-Kutta methods, stability; Partial differential equations, posedness of differential equations; Partial differential equations, numerical solution, finite difference methods, difference science, modified equation, diffusion, dispersion; Conservation laws and their numerical solution, shallow water equations, Euler equation methods; Practical computation in Matlab system for numerics and Maple for analysis of schemes. Inertial Fusion Physics	in coscopic quantum procescopic quantum processoric quantum proces	henomena ckade and 4 of significant 5 s, hyperbolik, proximation, thods, ALE 4
The subject of cou in quantum fluids 12ASF The lecture "Astrop 12DRP Ordinary differentia parabolic and ellipt stability, converge 12FIF These lectures air	Superconductivity and Low Temperature urse is: low temperature physics, including cooling methods, low temperature technique, and measurement of low temperatures; macr s (superfluidity and superconductivity), quantum crystals and diffusion, mesoscopic phenomena in electron systems, quantum Hall eff single electron transistor. Astrophysics physics" is a continuation of the basic physics courses. In this relatively captivating area of physics, students will review and deepen the aspects of physics, such as mechanics, optics, the theory of relativity, quantum theory, radiation, and more. Differential Equations on Computer al equations, analytical methods; Ordinary differential equations, numerical methods, Runge-Kutta methods, stability; Partial differential equations, posedness of differential equations; Partial differential equations, numerical solution, finite difference methods, difference sc ence, modified equation, diffusion, dispersion; Conservation laws and their numerical solution, shallow water equations, Euler equation methods; Practical computation in Matlab system for numerics and Maple for analysis of schemes. Inertial Fusion Physics m to introduce to the topic of inertial confinement fusion (ICF). Physical processes, which take place during the individual stages before	is coscopic quantum processopic quantum proces	henomena ckade and 4 of significant 5 , hyperbolik, proximation, thods, ALE 4 n of the fuel
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12SFMC2	Computer Simulations in Many-particle Physics 2	ZK	2					
Advanced methods of Monte Carlo and molecular dynamics and their applications to various problems: critical phenomena, complex molecules, non-equilibrium phenomena, transport								
coefficients, kinetic MC, optimalization problems, quantum MC, ab initio simulations, Car-Parrinello method.								
12UM	Introduction to Management	ZK	2					
Modern manager	Modern management conception, managerial functions, managerial activities. Managerial decision tasks, business strategy. Human resources management, Staff motivation and							
evaluation, team	vork, labour code. System marketing conception, marketing goals, marketing strategy. Marketing planning and decision making. Mark	eting mix, product	life cycle,					
	publicity campaign.							
14NMR	Materials Science for Reactors	ZK	2					
	Materials for classical and fusion reactors							
16DNEU	Neutron Dosimetry	ZK	2					
Methods based on	nuclear reactions with neutrons, methods based on recoiled nuclei, the time-of-flight method, neutron selectors and monochromators	, activation method	ds, methods					
of integr	ating neutron dosimetry, possibilities of use of various methods, calibration of neutron dosimeters and other dose and dose rate measured	suring instruments	i.					
16REL	Radiation Effects in Matter	ZK	2					
History of radioly	sis, track, stages of radiolysis, reaction kinetics, radiation chemical yield, experiments in radiolysis, classical methods, pulse radiolysis	s, EPR, primary pi	roducts of					
radiolysis, excited	states, solvated electrons, free radicals, radiolysis of gases, water, water solutions, organic liquids, radiolysis of solid materials, ionic	crystals, polymers	s, glasses,					
	metals and alloys, radiation technology, sterilisation, crosslinking and degradation of polymers, treatment of foods.							
16ZIVO	Introduction to Environment	KZ	2					
Ozone layer red	uction, global warming (greenhouse effect), acid rain, smog, chemicalization, astrophysical theory, cosmic rays, primordial elements, a	atmosphere conta	mination,					
measuring of imiss	ons and emissions, hydrosphere, waste dumping, fossil fuel, alternative sources, solar energy, water energy, wind energy, geothermal	l energy, biomass o	combustion,					
	hydrogen energetic, galvanic and fuel couples, principle of sustainable development							
16ZJT	Nuclear Technology Devices	ZK	2					
Basic scheme of n	uclear reactor and nuclear power plant, chain fission reaction development, factors influencing reactivity, internal fuel cycle, main con	nponents of nuclea	ar energetic					
reactor, most impo	ortant reactor types, linear high-voltage accelerators, linear high-frequency accelerators, accelerators based on cyclotron, microtron, I	betatron, electron	and proton					
	synchrotrons, electron and ion sources for accelerators, targets.							
17PRJT	Nuclear Technology Devices	ZK	2					
The course is focus	ed on instrumentation for neutron detection and gamma ray spectrometry used for reactor experiments and neutron instrumentation of	of nuclear facilities.	The lecture					
	is supplemented by practical demonstrations of equipment used at the VR-1 reactor.							

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