

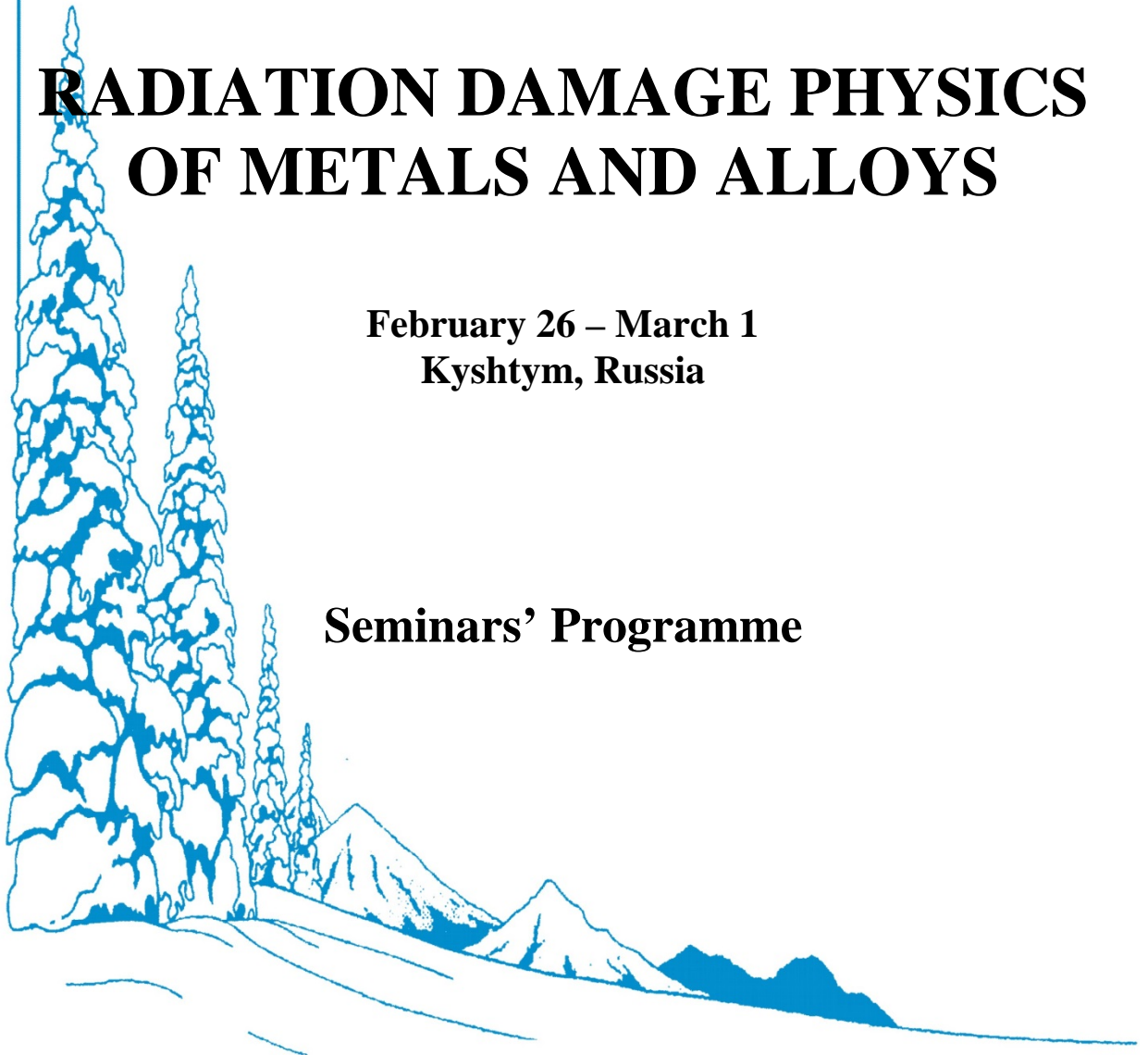
**The Fifteenth International Ural Seminar**



# **RADIATION DAMAGE PHYSICS OF METALS AND ALLOYS**

**February 26 – March 1  
Kyshtym, Russia**

**Seminars' Programme**



**2024**

## **Seminar Organizers**

The M.N. Mikheev Institute of Metal Physics, Urals Branch of RAS  
The Russian Federal Nuclear Center – Zababakhin All-Russian Scientific Research Institute of Technical Physics  
The Scientific Council on Radiation Physics of Solids, RAS

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**The Organizing Committee cordially thanks all Sponsors for their support to the Russian science. We hope that our meeting in Snezhinsk will serve to promote and expand further scientific contacts.**

## Sunday, February 25

15:00-24:00	<b>ARRIVALS, CHECK-INS, ACCOMMODATION OF SEMINAR ATTENDEES</b>
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19:00-20:00	<b>DINNER</b>
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## Monday, February 26

8:00-9:00	<b>BREAKFAST</b>
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9:00-9:30	<b>SEMINARS' OPENING</b> Conf. room No. 1 Presenters: <i>A.V. Kozlov, V.V. Dremov</i>
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9:00-9:30	<b>Opening of the Seminar, greeting of the participants</b>
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9:30-11:00	<b>PLENARY SESSION</b> Conf. room No. 1 Chairman: <i>V.V. Dremov</i>
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9:30-10:05	M.F. Akhmetov. Ekaterinburg, Russia. <b>Analytical equipment from friendly countries adapted for the study of active samples</b>
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10:15-10:50	R.P. Petrov. Moscow, Russia. <b>Gloveboxes and glovebox lines «SPECS GB»: made in russia laboratory equipment for lithium battery research, development &amp; production</b>
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11:00-11:30	<b>COFFEE BREAK</b>
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<b>SECTION MEETINGS</b>			
11:30-13:30	<b>Section 1: General problems of radiation damage physics</b> Conf. room No. 1 Chairman: <i>A.V. Kozlov</i>	11:30-13:30	<b>Section 2: Digital tools of computer materials science</b> Conf. room No. 2 Chairman: <i>V.A. Pechenkin</i>
11:30-11:55	S.A. Averin. Zarechnyi, Russia. <b>Deformation and destruction of austenitic steels under the influence of neutron irradiation</b>	11:30-11:55	A.V. Ianilkin. Moscow, Russia. <b>Swelling model with explicit space distribution of sinks</b>
12:00-12:25	M.A. Semkin. Ekaterinburg, Russia. <b>Effect of irradiation with fast neutrons on the structural state of niobium oxide</b>	12:00-12:25	R. Rymzhanov. Dubna, Russia. <b>Multi-scale modeling of the effects of swift heavy ions in solids</b>

12:30-12:55	A.M. Ovcharenko. Moscow, Russia. <b>Theoretical study of radiation-induced swelling in copper, vanadium and austenitic steel irradiated with neutrons</b>	12:30-12:55	P.V. Chirkov. Snezhinsk, Russia. <b>Impurities and defects influence on phonon dynamics from first principles calculation</b>
13:00-13:25	E.A. Korneeva. Dubna, Russia. <b>Stability of the alloys with yttrium oxides additive under ion irradiation with fission fragments energies</b>	13:00-13:25	K.P. Migdal. Moscow, Russia. <b>Monte Carlo modeling of low-energy electrons knocked-out by ions of moderated energies in silicon devices</b>

13:30-13:40	<b>PHOTO</b>
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13:40-14:30	<b>LUNCH</b>
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<b>YOUNG BEGINNERS' SCHOOL</b>			
15:00-17:00	<b>Section 1: General problems of radiation damage physics</b> Conf. room No. 1 Chairman: <i>P.V. Bykov</i>	15:00-17:00	<b>Section 2: Digital tools of computer materials science</b> Conf. room No. 2 Chairman: <i>V.V. Ovchinnikov</i>
15:00-15:20	D.N. Demidov. Moscow, Russia. <b>Effect of radiation defects diffusion mechanism on dislocations sink strengths in BCC Fe and V metals</b>	15:00-15:20	G.S. El'tsov. Snezhinsk, Russia. <b>Zirconium phase diagram from ab initio molecular dynamics</b>
15:30-15:50	N.A. Epifanov. Moscow, Russia. <b>Joint action of pulsed ion beams and plasma on tantalum surface</b>	15:30-15:50	M.V. Lapin. Snezhinsk, Russia. <b>Finite element modeling of casting processes, heat treatment and structure formation of cast workpieces</b>
16:00-16:20	E.R. Kim. Almaty, Kazakhstan. <b>Study of mechanical properties and fracture features of ferrite-martensitic steel EP-450 irradiated by neutrons in the BN-350 reactor</b>	16:00-16:20	E.A. Meshkov. Moscow, Russia. <b>Modeling of the kinetics of secondary phases formation in multicomponent systems by methods of computational materials science</b>
16:30-16:50	V.S. Nosovets. Snezhinsk, Russia. <b>Injection-enhanced annealing kinetics of point and group radiation-induced defects in GaN LEDs</b>	16:30-16:50	D.A. Monstakov. Ozersk, Russia. <b>Estimation of the temperature field when placing solidified high-activity pearlitic slurries in a non-returnable container</b>

17:00-17:30	<b>COFFEE BREAK</b>
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<b>YOUNG BEGINNERS' SCHOOL</b>			
17:30- 19:00	<b>Sections:</b> <b>1. Materials for nuclear and thermonuclear power engineering</b> <b>3. Structural materials for nuclear and thermonuclear power engineering: new approaches to creation of radiation-resistant materials</b> <b>Conf. room No. 1</b> Chairman: <i>S.V. Rogozhkin</i>	17:30- 19:00	<b>Sections:</b> <b>2. Digital tools of computer materials science</b> <b>4. Fuel for nuclear power: structure, physical and chemical properties</b> <b>Conf. room No. 2</b> Chairman: <i>M.A. Semenov</i>
17:30- 17:50	A.Iu. Tarapeeva. Almaty, Kazakhstan. <b>Changes in magnetic properties during post-irradiation isochronous annealing of austenitic steels 12Cr18Ni10Ti and 08Cr16Ni11Mo3 irradiated in BN-350 and VVR-K reactors</b>	17:30- 17:50	V.R. Pelenitsyn. Moscow, Russia. <b>First-principles study of the properties of radiation defects in silicon</b>
18:00- 18:20	A.V. Klauz. Moscow, Russia. <b>Study of the effect of Fe ion irradiation on the nanostructure of oxide disperse-strengthened steels by atom-probe tomography and transmission electron microscopy methods</b>	18:00- 18:20	E.Iu. Tataurov. Ozersk, Russia. <b>A search of electrodes' used in electrochemical reduction reextraction of Pu and Np porous layer production technology</b>
18:30- 18:50	K.M. Ladeishchikov. Zarechnyi, Russia. <b>Determination of elasticity characteristics of fuel cladding material in the initial state and after operation in the reactor</b>	18:30- 18:50	V.Iu. Iarkov. Zarechnyi, Russia. <b>Application of the method of orientation microscopy to study the structural-phase state of irradiated zirconium alloys</b>

20:00- 22:00	<b>WELCOME PARTY</b>
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**Tuesday, February 27**

8:00- 9:00	<b>BREAKFAST</b>
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9:00- 10:55	<b>PLENARY SESSION</b> <b>Conf. room No. 1</b> Chairman: <i>S.V. Rogozhkin</i>
9:00- 9:50	Prof. Z.W. Zhang. Harbin Engineering University, Harbin, China <b>Irradiation effects in steels and alloys</b>
10:10- 10:45	M.S. Slobodian. Tomsk, Russia. <b>Prospects for implementation of high-entropy alloys as radiation-resistant structural materials</b>

11:00-11:30	<b>COFFEE BREAK</b>
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<b>SECTION MEETINGS</b>			
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11:30-13:30	<b>Section 3: Structural materials for nuclear and thermonuclear power engineering: new approaches to creation of radiation-resistant materials</b> <b>Conf. room No. 1</b> Chairman: <i>V.M. Chernov</i>	11:30-13:30	<b>Sections 6: Radiation technologies for modification of physical-mechanical properties of materials</b> <b>Conf. room No. 2</b> Chairman: <i>A.V. Mirmelshtein</i>
11:30-11:55	N.V. Glushkova. Zarechnyi, Russia. <b>Effect of neutron irradiation on microstresses in austenitic steel</b>	11:30-11:55	V.I. Bobrovskii. Ekaterinburg, Russia. <b>Initialization of the shape memory effect by irradiation with fast neutrons</b>
12:00-12:25	N.S. Kirilkin. Dubna, Russia. <b>Structural effects of high energy ion irradiation in partially stabilized zirconia</b>	12:00-12:25	P.V. Bykov. Izhevsk, Russia. <b>The effect of alternating irradiation with O<sup>+</sup> and N<sup>+</sup> ions on the composition, structure and electrochemical properties of titanium alloy VT6</b>
12:30-12:55	G.N. Churilov. Krasnoyarsk, Russia. <b>Alloying of aluminum by boron with high degree uniformity</b>	12:30-12:55	A.Iu. Drozdov. Izhevsk, Russia. <b>Formation of a carbon film on the surface of a metal alloy of the Cu-Ni system under ion irradiation conditions</b>
13:00-13:25	R.P. Karagergi. Zarechnyi, Russia. <b>Microstructure the fractures of ring samples from austenitic steel shell irradiated to a damaging dose of more than 100 dpa after compression in the radial direction</b>	13:00-13:25	V.V. Ovchinnikov. Ekaterinburg, Russia. <b>Radiation-dynamic effects under corpuscular irradiation. Radiation shaking instead of temperature</b>

13:30-14:30	<b>LUNCH</b>
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<b>YOUNG BEGINNERS' SCHOOL</b>			
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15:00-17:00	<b>Sections:</b> <b>3. Materials for nuclear and thermonuclear power engineering</b> <b>7. Radiation effects in magnets, superconductors, semiconductors and insulators</b> <b>Conf. room No. 1</b> Chairman: <i>A.F. Gubkin</i>	15:00-17:00	<b>Section 8: Facilities and techniques of experiment</b> <b>Conf. room No. 2</b> Chairman: <i>V.A. Pavlenko</i>
15:00-15:20	A.A. Potekhin. Moscow, Russia. <b>Structure and properties degradation of VVER-1000 reactor pressure vessel materials and its impact on service time</b>	15:00-15:20	Iu.A. Karzanov. Ozersk, Russia. <b>Test procedure for control of plutonium in MOX-fuel by tablet glyph</b>

15:30-15:50	N.A. Stakanova. Ozersk, Russia. <b>Selection of a heat-resistant alloy for the manufacture of a drain die of a small-sized melter designed by «FSUE Mayak PA»</b>	15:30-15:50	A.A. Konovalov. Snezhinsk, Russia. <b>Pulsed ionizing radiation detection using optical fiber</b>
16:00-16:20	A.A. Khomich. Moscow, Russia. <b>Study of the radiation hardening mechanisms of heat-resistant oxide dispersion strengthened steels in accelerated tests using ion irradiation and ultramicroscopic analysis</b>	16:00-16:20	A.S. Kustov. Snezhinsk, Russia. <b>The effect of thermal neutrons on single-event memory cell upsets</b>
16:30-16:50	A.A. Nazarov. Nizhnii Novgorod, Russia. <b>Study of radiation-resistant yttrium aluminum garnet ceramics irradiated with high-energy xenon ions</b>	16:30-16:50	M.V. Marchuk. Snezhinsk, Russia. <b>Definition of a dominant mechanism for microcontroller upsets induced by pulsed low-energy proton radiation</b>

17:00-17:30	<b>COFFEE BREAK</b>
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<b>YOUNG BEGINNERS' SCHOOL</b>			
17:30-19:00	<p style="text-align: center;"><b>Sections:</b></p> <p style="text-align: center;"><b>6. Radiation technologies for modification of physical-mechanical properties of materials</b></p> <p style="text-align: center;"><b>7. Radiation effects in magnets, superconductors, semiconductors and insulators</b></p> <p style="text-align: center;"><b>8. Facilities and techniques of experiment</b></p> <p style="text-align: center;"><b>Conf. room No. 1</b></p> <p style="text-align: center;">Chairman: <i>V.V. Ovchinnikov</i></p>		
17:30-17:50	E.V. Makarov. Ekaterinburg, Russia. <b>Near delamination of the alloy Fe-15 at.% Cr, initially disordered serve plastic deformation during irradiation with Ar<sup>+</sup> ions (E = 10 keV) and annealing in an furnace at the same temperature</b>		
18:00-18:20	I.V. Martirosian. Moscow, Russia. <b>Numerical analysis of the dynamics of radiation-induced defects in HTS composites</b>		
18:30-18:50	A.I. Shamatova. Astana, Kazakhstan. <b>Advanced thermorefectance techniques for non-contact measurement of micro-scale phonon thermal transport in swift heavy ion irradiated yttrium aluminium garnet</b>		

19:00-20:00	<b>DINNER</b>
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**Wednesday, February 28**

8:00-9:00	<b>BREAKFAST</b>
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9:00-11:00	<b>PLENARY SESSION</b> Conf. room No. 1 Chairman: <i>V.M. Chernov</i>
9:00-9:35	V.A. Pechenkin. Obninsk, Russia. <b>Investigation of irradiation effects in structural materials with ion accelerators</b>
9:40-10:15	S.V. Mitrofanov. Dubna, Russia. <b>The project of a cyclotron complex for simultaneous irradiation of materials with H, He, Me (Cr, Fe, Ni) ions</b>
10:20-10:55	B.A. Loginov. Moscow, Russia. <b>A new version of the implementation of the tasks of radiation materials science - on the world's first satellite probe microscope</b>

11:00-11:30	<b>COFFEE BREAK</b>
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<b>SECTION MEETINGS</b>			
11:30-13:30	<b>Sections:</b> <b>3. General problems of radiation damage physics</b> <b>5. Materials for nuclear and thermonuclear power engineering</b> Conf. room No. 1 Chairman: <i>A.V. Mirmelshtein</i>	11:30-13:30	<b>Sections:</b> <b>7. Radiation effects in magnets, superconductors, semiconductors and insulators</b> <b>8. Facilities and techniques of experiment</b> Conf. room No. 2 Chairman: <i>Yu.N. Zuev</i>
11:30-11:55	A.F. Gubkin. Ekaterinburg, Russia. <b>Spin-slip effect in the rare-earth intermetallic compound Ho<sub>3</sub>Co</b>	11:30-11:55	V.P. Popov. Novosibirsk, Russia. <b>Defects in silicon and high-k dielectrics of SOI and SOS structures after irradiation with fast heavy ions Xe and Bi</b>
12:00-12:25	P.S. Savchenkov. Moscow, Russia. <b>Uncommon magnetism in rare-earth compounds with strong electronic correlations: neutron spectroscopy data and modern model concepts</b>	12:00-12:25	N.V. Glushkova. Zarechnyi, Russia. <b>Determination of the migration energy of vacancies in metals using low temperature neutron irradiation</b>
12:30-12:55	N.V. Kataeva. Ekaterinburg, Russia. <b>Structure and creep characteristics of the ChS-139 and EK-181 martensitic steels</b>	12:30-12:55	V.A. Skuratov. Dubna, Russia. <b>Confocal optical spectroscopy of radiation defects in MgAl<sub>2</sub>O<sub>4</sub> crystals irradiated with high energy heavy ions</b>



13:00-13:25	K.A. Kozlov. Ekaterinburg, Russia. <b>Mössbauer analysis of the structure evolution of the EP823 and EP823-ODS steels under neutron irradiation in conditions of mechanical stresses in the BN600 reactor</b>	13:00-13:25	P.V. Bykov. Izhevsk, Russia. <b>Application of electron spectroscopy methods for studying thin films and ion-modified materials</b>
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13:30-14:30	<b>LUNCH</b>
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15:00-18:00	<b>EXCURSION</b>
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19:00-20:00	<b>DINNER</b>
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### Thursday, February 29

8:00-9:00	<b>BREAKFAST</b>
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9:00-11:00	<b>PLENARY SESSION</b> Conf. room No. 1 Chairman: <i>V.I. Bobrovskii</i>
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9:00-9:35	A.V. Kozlov. Zarechnyi, Russia. <b>Formation and evolution of radiation defects under low temperature neutron irradiation</b>
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9:40-10:15	S.V. Rogozhkin. Moscow, Russia. <b>Comprehensive analysis of the nanostructure of oxide dispersion-strengthened steels</b>
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10:20-10:55	V.M. Chernov. Moscow, Russia. <b>Low activation structural materials for nuclear and thermo-nuclear reactors – challenges and the way forward</b>
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11:00-11:30	<b>COFFEE BREAK</b>
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<b>SECTION MEETINGS</b>			
11:30-13:20	<b>Section 3: Structural materials for nuclear and thermonuclear power engineering: new approaches to creation of radiation-resistant materials</b> <b>Conf. room No. 1</b> Chairman: <i>S.A. Averin</i>	11:30-13:00	<b>Sections:</b> <b>6. Radiation technologies for modification of physical-mechanical properties of materials</b> <b>8. Facilities and techniques of experiment</b> <b>Conf. room No. 2</b> Chairman: <i>A.Yu. Drozdov</i>
11:30-12:10	Dr. Y. Zhang. Harbin, China. <b>Enhanced irradiation tolerance of a medium entropy alloy via precipitation and dissolution of nanoprecipitates</b>	11:30-11:55	V.I. Pastukhov. Zarechnyi, Russia. <b>Fracture features of irradiated austenitic steel at elevated temperatures</b>
12:20-12:45	S.V. Fedotova. Moscow, Russia. <b>The phase formation patterns in the VVER-type reactor pressure vessel steels</b>	12:00-12:25	A.N. Tarasenkov. Moscow, Russia. <b>Physico-mechanical properties of Ti/Al and Ni/Al multilayer films after ion-beam mixing</b>
12:50-13:15	I.A. Portnykh. Zarechnyi, Russia. <b>Microstructure evolution of steel Cr16-Ni19 type under neutron irradiation at initial stage of radiation swelling</b>	12:30-12:55	P.V. Bykov. Izhevsk, Russia. <b>Features of formation of surface layers of titanium alloy VT6 under conditions of plasma treatment of N<sup>+</sup> ions</b>

13:30-14:30	<b>LUNCH</b>
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15:00-17:00	<b>ROUNDTABLE DISCUSSION</b> <b>A comprehensive description of radiation-induced processes and the possibility of using it to predict and find ways to increase the service life of elements of in-reactor structures</b> <b>Conf. room No. 1</b> Moderators: <i>A.V. Kozlov, V.V. Dremov</i>
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17:00-17:30	<b>COFFEE BREAK</b>
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17:00-19:00	<b>POSTER SESSION</b>
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20:00-23:00	<b>BANQUET</b>
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## Friday, March 1

8:00-9:00	<b>BREAKFAST</b>
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9:00-10:20	<b>PLENARY SESSION</b> <b>Conf. room No. 1</b> Chairman: <i>V.A. Pechenkin</i>
9:00-9:35	A.B. Sivak. Moscow, Russia. <b>Multiscale approach to modelling of radiation creep and radiation swelling in metals</b>
9:40-10:15	A.V. Ianilkin. Moscow, Russia. <b>Simplified atomistic based kinetic model for swelling prediction</b>

<b>SECTION MEETINGS</b>			
10:20-11:20	<b>Sections:</b> <b>1. General problems of radiation damage physics</b> <b>3: Structural materials for nuclear and thermonuclear power engineering: new approaches to creation of radiation-resistant materials</b> <b>Conf. room No. 1</b> Chairman: <i>V.A. Pechenkin</i>		
10:20-10:45	V.V. Ovchinnikov. Ekaterinburg, Russia. <b>Constuction of a set of fundamental physical constants of unit and zero dimensions</b>		
10:50-11:15	M.P. Kashchenko. Ekaterinburg, Russia. <b>Mass spectroscopic registration of modified tungsten isotopes with increased masses</b>		

11:30-12:00	<b>COFFEE BREAK</b>
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12:00-13:00	<b>SEMINARS' CLOSING</b> <b>Conf. room No. 1</b> Chairman: <i>A.V. Kozlov, V.V. Dremov</i> <b>1. Results of Contest of Young Participants. Awards for best presentations at Young Beginners' School</b> <b>2. Summarizing of the Seminars' results</b>
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13:30-14:30	<b>LUNCH</b>
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19:00-20:00	<b>DINNER</b>
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**Saturday, March 2**

8:00- 9:00	<b>BREAKFAST</b>
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## POSTERS

D.A. Beliaev. Snezhinsk, Russia.

**Use of the photogrammetrical reconstruction of the fractures during the fractographic examinations — advantages and first results**

P.V. Bykov. Izhevsk, Russia.

**Physico-mechanical properties of Ti/Al and Ni/Al multilayer films after ion-beam mixing**

V.I. Elesina. Krasnoiarsk, Russia.

**Set up for plasma-chemical production of composite materials**

M.V. Lapin. Snezhinsk, Russia.

**The influence of thermodynamic characteristics and mesh size on the accuracy of modeling casting defects**

Zh.B. Seksembaev. Astana, Kazakhstan.

**Estimation of instant permissible values of liner's admixture in MagLIF device fuel**

K.V. Shalomov. Ekaterinburg, Russia.

**Development and creating of additional equipment for low-dose irradiation with ioning gases**

E.A. Sherstobitova. Ekaterinburg, Russia.

**Topological analysis of Li<sup>+</sup> cations migration paths in lithium-vanadium bronze  
Li<sub>1+x</sub>V<sub>3</sub>O<sub>8</sub> (x = 0.1, 0.2, 0.3)**