



JUSTUS-LIEBIG-



UNIVERSITÄT
GIESSEN



IOM

CONFERENCE PROGRAM

8th RUSSIAN-GERMAN CONFERENCE

«ELECTRIC PROPULSIONS:

DEVELOPMENT AND APPLICATION

IN SPACE»

ABOUT CONFERENCE

The 8th Russian-German Conference on Electric Propulsions and their application 2020(+1) will take place from 11th to 15th of April 2021 in Kaliningrad. Both fundamental and applied research works related to the development of various types of electric propulsions and their application on board spacecraft designed for different purposes will be the topic of the conference. Near a half of all the operating or operated electric propulsions in space are made by EDB Fakel. In 2020 Fakel turned 65 years and we decided to hold a conference to celebrate this anniversary.

The Conference is intended for a contribution to the international cooperation both in industrial and scientific fields.

CO-CHAIRS

Garri A. Popov

Academician of the Russian Academy of Sciences, full member of the International Academy of Astronautics, Director of the Research Institute of Applied Mechanics and Electrodynamics of the Moscow Aviation Institute (RIAME MAI), Russia

Prof. Peter J.Klar

Prof. Dr., Director of 1 Institute of Physics, Justus-Liebig University Gießen, Germany

ORGANIZERS

Michael V. Korkunov

Dr., Director, JSC EDB Fakel, Russia

Evgeniy V. Kosmodemyansky

Dr., General designer, JSC EDB Fakel, Russia

KEY INFORMATION

Date	11 th – 15 th April, 2021
Location	Virtual
Fees	100 Euro
Website	rgcep.fakel-russia.com
Type	Full paper submission (oral presentation)

PROGRAM OF THE CONFERENCE

A total number of **59 talks** will be given by the speakers and fill out one complete conference week.

The conference agenda includes 8 Technical Sessions chaired by international experts with virtual oral presentation.

Paper topics:

- Ion thrusters;
- Stationary plasma thrusters;
- Magnetoplasmodynamic thrusters;
- Power sources and thruster-spacecraft conjunction
- Spacecraft with electric propulsions. Flight dynamics, propulsion control;
- Electric propulsion on the small, micro- and nano- satellites;
- Electric propulsions application in planets and asteroid rendezvous mission;
- Electric propulsion application for utilization of space debris.

The Conference materials, including all the presented abstracts, will be published on the conference home page and in the electronic collection.

All papers will be published in the Journal of Physics: Conference Series, IOP Publishing.

Kaliningrad time	Sunday, April 11, 2021	Monday, April 12, 2021	Tuesday, April 13, 2021	Wednesday, April 14, 2021	Thursday, April 15, 2021
10:00		Conference Welcome / Plenary Session	Technical Session A	Technical Session B	Technical Session F
11:00			Technical Session B	Technical Session C	
12:00					
13:00		Lunch & break	Lunch & break	Lunch & break	Lunch & break
14:00		Technical Session A	Technical Session B	Technical Session C	Technical Session G
15:00				Technical Session D	Technical Session H
16:00	Check-in / connection test				Technical Session E
17:00					
18:00					

Conference Welcome / Plenary Session	
Moderators:	<p><u>Garri A. Popov</u> - Academician of the Russian Academy of Sciences, full member of the International Academy of Astronautics, Director of the RIAME MAI</p> <p><u>Peter J. Klar</u> - Prof. Dr., Director of 1 Institute of Physics, Justus-Liebig University Gießen, Germany</p>

Monday, April 12, 2021		
Time	Authors	Paper title
10:00-10:45	P. Klar G. Popov M. Korkunov E. Kosmodemiansky	Words of Welcome to the 8 th Russian German Conference on Electric propulsion
10:45-11:00	P. Klar	Recent developments in Electric Propulsion
11:00-11:15	D. Loskutov	The Unified Product and Component Portal for Space Industry
11:15-11:30	H. Leiter	Electric propulsion – Challenges for academia and industry 2021 and beyond
11:30-12:00	M. Kaplin V. Panfilov O. Mitrofanova	A brief history and an overview of EDB Fasel
12:00-12:45	V. Kim D. Merkur'ev A. Semengin	Plasma Thrusters with closed drift of electrons: ideas and trends of development in the past and at present time
12:45-14:00	Lunch & break	

Technical Session A		Ion thrusters
Moderators:		<u>Alexander Lovtsov</u> - Dr., Head of department, Keldysh Research Center <u>Carsten Bundesmann</u> - Dr, Senior Researcher of IOM, Leipzig, Germany
		Monday, April 12, 2021
Time	Authors	Paper title
14:00-14:20	J.F. Plaza A. Post J. Toledo L. Conde J.L. Domenech-Garret J.M. Donoso	Electron emissions from NACES high performance cathode based on C12A7:e-electride material for in-space electric propulsion applications
14:20-14:40	D. Kashirin S. Semenikhin S. Khartov	Gas-Electric Isolator operation as part of a low-power Radio-Frequency Ion Thruster with a wide range of thrust control
14:40-15:00	B. T. Nauschütt P. Dietz N. G. Kleinmichel K. Holste H.J. Leiter P. J. Klar	Optical plasma diagnostics for Radio-Frequency Ion Thrusters
15:20-15:40	M. Reitemeyer D. Zschätzsch K. Holste P. J. Klar	Compatibility of the electride C12A7:e- with alternative propellants and production of thin films
15:40-16:00	Coffee break	
16:00-16:20	D. Zschätzsch M. Reitemeyer L. Chen J. F. Plaza A. Post P. J. Klar	Investigation of C12A7:E- under harsh conditions in relation to hollow cathode neutralizers
16:20-16:40	R. Akhmetzhanov A. Bogaty E. Bogachev S. Gordeev A. Elakov D. Kashirin V. Obukhov G. Popov M. Cherkasova J. Perminova	Research Tests of Low-Power Radio-Frequency Ion Thruster with Electrodes of Ion-Extraction System made of Carbon-Carbon Composite Material based on Non-Woven Carbon Frame IPRESSKON
16:40-17:00	H. Leiter et al	Commercial electric propulsion development and production – Ariane group projects and products
17:00-17:20	S. Gordeev S. Kanev S. Khartov	Numerical mathematical model of radio-frequency Discharge in the Discharge chamber of Radio-frequency Ion Source

Tuesday, April 13, 2021		
Time	Authors	Paper title
10:00-10:20	A. Elakov E. Bogachev A. Mogulkin V. Nigmatzyanov	New Features in Application of High-Dense Carbon-Carbon Composite On Non-Woven Basis In Ion Source's Ion Extraction Systems
10:20-10:40	V. Abgaryan A. Kupreeva A. Melnikov V. Nigmatzyanov	Radio-frequency ion source temperature field modeling and measurements
10:40-11:00	L. Pietzonka C. Eichhorn F. Scholze D. Spemann	Laser-Induced Fluorescence Velocimetry on a Radiofrequency-Driven Ion Source
11:00-11:20	Coffee break	

Technical Session B		Stationary plasma thrusters
Moderators:		<u>Vladimir Kim</u> - Prof. Dr., Chief researcher at RIAME <u>Carsten Bundesmann</u> - Dr, Senior Researcher of IOM, Leipzig, Germany
		Tuesday, April 13, 2021
Time	Authors	Paper title
11:20-11:40	F. G. Hey S. Gabriel P. Klar M. Vaupel G. Kottke G. Papathanasopoulos M. Ploncard J. Schilm F. Scortecci G. Sisinni K. Wätzig	Iodine Fed Advanced Cusp Field Thruster - iFACT
11:40-12:00	C. R. Koppel G. Quinsac	Electric Thruster Selection Criteria and Examples
12:00-12:20	A. Neumann M. Brchneleva K. Hannemann	Modeling of Cryopumps for EP Usage
12:20-14:40	P. Dietz K. Keil P.J. Sarnoch K. Holste P.J. Klar	Optimization OF AN IODINE FED RF-NEUTRALIZER
12:40-13:00	D.A. Maystrenko A.A. Shagayda A.S. Lovtsov	Probe Development for Electric Propulsion Diagnosis
13:00-14:00	Lunch & break	

Technical Session B		Stationary plasma thrusters
Moderators:		<u>Vladimir Kim</u> - Prof. Dr., Chief researcher at RIAME <u>Kristof Holste</u> - Dr, Senior Researcher of JLU Gießen
		Tuesday, April 13, 2021
Time	Authors	Paper title
14:00-14:20	F. Kiefer K. Holste C. Volkmar R. Thüringer P. J. Klar	Electromagnetic Compatibility Test Facility with Reverberation chamber for Electric Propulsion
14:20-14:40	C. Bundesmann F. Scholze C. Eichhorn D. Spemann	EP Activities at IOM in Leipzig
14:40-15:00	M. Kaplin O. Mitrofanova V. Gopanchuk M. Bernikova L. Grebenev S. Olotin E. Shiryayeva	The study of the operational process specific features in very low-power plasma accelerators
15:20-15:40	V. Kim V. Zarkharchenko V. Kalyazin D. Merkur'ev G. Popov E. Shilov	Development of the low power SPT experimental models operating with Krypton and Xenon with increased design lifetime
15:40-16:00	S. Ivakhnenko E. Vorobiov S. Shilov O. Plotnikova A. Plokhikh N. Vazhenin D. Merkurev V. Zakharchenko	Spectral-temporal characteristics of self emission from TAL in the radio-frequency band for different propellants
16:00-16:20	V. She S. Sannikova D. Gladkov Ya. Nazarova A. Nasedkin A. Berg	Mono-crystalline Lanthanum Hexaboride production peculiarities

Technical Session B		Stationary plasma thrusters
Moderators:		<u>Vladimir Kim</u> - Prof. Dr., Chief researcher at RIAME <u>Franz Georg Hey</u> – Dr, Laboratory for Enabling Technologies, Airbus
		Wednesday, April 14, 2021
Time	Authors	Paper title
10:00-10:20	A. Komarov A. Nesterenko V. Sokolov R. Podgornyh	The new possibilities to increase the SPT-140D thruster reliability
10:20-10:40	S. Shilov S. Ivahnenko E. Vorobiev D. Manegin V. Volkov S. Olotin	Parametric-test of low power thruster with anode layer on krypton
10:40-11:00	A. Plokhikh N. Vazhenin D. Merkurev V. Zakharchenko	Spectral-temporal characteristics of self emission from SPT-70 in the radio-frequency band for different propellants
11:00-11:20	R. Gnizdor A. Markov D. Semenenko O. Tolstel	Development and research of parameters and characteristics of modified SPT-70M operates on xenon and krypton
11:20 – 11:40	K. Guskov A. Rummyantsev P. Chubov A. Sinitsin	Problems of measuring propellant flow rate on the test stands and their solution
11:40-12:00	Coffee break	

Technical Session C		Magnetoplasmodynamic thrusters
Moderators:		<u>Alexander Semenkin</u> - Dr., Deputy General Director, Keldysh Research Center <u>Franz Georg Hey</u> – Dr, Laboratory for Enabling Technologies, Airbus
		Wednesday, April 14, 2021
Time	Authors	Paper title
12:00-12:20	M.Collier-Wright M.La Rosa Betancourt D.Hindley G.Hedrich A.Behnke	High-Temperature Superconductor based Power System Architectures as enablers for High Power Missions
12:20-12:40	A. Boxberger G. Herdrich A. Behnke	Assessment of Optimal Operational Regimes of Steady State Applied Field MPD Thrusters at IRS
12:40-13:00	S. Scharmann K. Holste P. J. Klar K. Hannemann A. Neumann J. Simon S. Peterschmitt D. Packan	A Thrust Balance for the Minotor ECR Thruster
13:00-13:40	Lunch & break	
13:40-14:00	G. Dyakonov N. Lyubinskaya S. Semenikhin	Influence of Discharge Channel Parameters on the APPT Performance
14:00-14:20	A. Bogaty G. Dyakonov N. Lyubinskaya G. Popov S. Semenikhin	The Problem of optimal Discharge Energy in Ablative Pulsed Plasma Thruster

Technical Session D	Power sources and thruster-spacecraft conjunction
Moderators:	<u>Alexander Semenkin</u> - Dr., Deputy General Director, Keldysh Research Center <u>Frank Jansen</u> – Dr, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

		Wednesday, April 14, 2021
Time	Authors	Paper title
14:20-14:40	A. Gafarov L. Zakharenkov E. Kuvshinova A. Lovtsov I. Ogloblina A. Semenkin A. Solodukhin	Modern trends in Spacecraft Power and Propulsion Systems and Electric Thrusters
14:40-15:00	A. Koroteev K. Gotovtsev L. Zakharenkov A. Karevskiy A. Lovtsov Yu. Oshev M. Selivanov A. Semenkin A. Solodukhin	Studies of joint operation of Electric Propulsion and Power Supply System based on closed Brayton cycle

Technical Session E	Spacecraft with electric propulsions. Flight dynamics, propulsion control
Moderators:	<u>Olga Starinova</u> - Prof. Dr., Samara University <u>Frank Jansen</u> – Dr, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

Wednesday, April 14, 2021		
Time	Authors	Paper title
15:00-15:20	V. Salmin K. Petrukhina A. Kvetkin Yu. Lazarev	Approximate method for calculating Interorbital Flights of a Spacecraft with low-thrust Engines
15:20-15:40	O. Starinova D. Chen V. Kovalev	Multi-Criteria Optimization of Interplanetary Electric Propulsion Missions
15:40-16:00	R. Khabibullin O. Starinova M. Rozhkov	Transfer of 433 EROS Comparison of Spacecraft with Non-Perfectly Reflecting Solar Sail And Low Thrust Engine
16:00-16:20	M. Fain O. Starinova	Spacecraft transfers between L1 and L2 libration points in the Earth-Moon system for a number of electric propulsion thrusters
16:20-16:40	E. Sergaeva O. Starinova A. Chekashov	Design and ballistic Analysis of Spacecraft Missions with an Electric Propulsion System to an Asteroid
16:40-17:00	A. Chekashov O. Starinova	Simulation of Spacecraft motion to the Earth Quasi-Satellite (469219) 2016 HO3 using Low-Thrust Propulsion
17:00-17:20	V. Salmin A. Chetverikov	Narrowing the area of deviation of the final trajectory parameters using the algorithm for refining the thrust of electric propulsion

Technical Session F	Electric propulsion on the small, micro- and nano- satellites
Moderators:	<u>Alexander Sizov</u> - Chief of department, JSC «TsNIIMash» <u>Frank Jansen</u> – Dr, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

Thursday, April 15, 2021		
Time	Authors	Paper title
10:00-10:20	T. Henning F. L. Kunze P. J. Klar	Three-dimensional microlithography as an enabling technology for miniaturised electro spray thrusters
10:20-10:40	V. Salmin K. Petrukhina A. Russkikh A. Kvetkin	Designing a transport module with low-thrust electric Propulsion engines
10:40-11:00	V. Volotsuev V. Salmin M. Gogolev	Analysis of the Effective use of the SPD-50 engine to support the low orbit of the AIST-2 Small Spacecraft
11:00-11:20	V. Volotsuev	Analysis of the effect of rotation of small Spacecraft Solar Panels on low orbit correction using an Electric Jet Engine
11:20-11:40	R. Akhmetzhanov A. Bogatyi S. Gordeev G. Dyakonov R. Elnikov D. Kashirin G. Popov S. Semenikhin	Ablative Pulsed Plasma Thruster for controlling Orbital Motion of Small Satellite Operating as part of a Constellation of Earth Remote Sensing Satellites
11:40-12:00	Coffee break	
12:00-12:20	V. Salmin I. Tkachenko S. Safronov A. Chetverikov V. Vootsuev	Formation and maintenance of the orbital structure of multi-level space constellations for earth monitoring using electric propulsion
12:20-12:40	A. Ivliev A. Kumarin	Propulsion System for a Scientific-Educational Nanosatellite
12:40-13:00	V. Khartov E. Tverdokhlebova A. Pilnikov A. Sizov A. Golovin	Current state and perspective development trends of propulsion systems for small spacecraft of multi-satellite orbital constellations

Thursday, April 15, 2021		
Time	Authors	Paper title
13:00-13:20	V. Bondarenko E. Chubenko S. Redko A. Dolgiy I. Prokhorenko	Colloid propulsion system for Nanosatellites
13:20-14:20	Lunch & break	

Technical Session G	Electric propulsions application in planets and asteroid rendezvous mission
Moderators:	<u>Alexander Solodukhin</u> - Dr., Deputy Head of Division, SSC Keldysh Research Centre <u>Frank Jansen</u> – Dr, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

		Thursday, April 15, 2021
Time	Authors	Paper title
14:20-14.40	F. Jansen B. Bergmann M. Bittner T. Brandt F. Damme E. Detsis S. Ferraris I. Funaki O. Funke J. T. Grundmann L. Nogueira Frutuoso Guimaraes M. Hillebrandt A. S. Koroteev J. C. Kuijper F. Masson V. Maiwald J. Oberst S. Oriol S. Pospisil M. Richter M. Reynders L. Schanz B. Schmidt-Tedd A.V. Semenkin A. E. Solodukhin I. Stekl T. Tinsley M. C. Tosi J.-C. Worms S. Wüst	MARS- plus EUROPA-INPPS Flagship Missions with High Power Electric Thrusters and Heavy Science Payload

Technical Session H	Electric propulsion application for utilization of space debris
Moderators:	<u>Ekaterina Tverdokhlebova</u> - Dr., Head of department, TSNIIMASH, Russia <u>Frank Jansen</u> – Dr, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)

Thursday, April 15, 2021		
Time	Authors	Paper title
14:40-15.00	J. Skalden L. Ackermann M. Ehresmann G. Herdrich	Current Experimental Activities on developing an ARCJET Deorbit Module at IRS
15:00-15.20	S. Ishkov G. Filippov P. Fadeenkov	Low-thrust Engines applying in problem of insertion and space debris disposing at geostationary orbit