

# **2018 20th International Symposium on High-Current Electronics (ISHCE 2018)**

**Tomsk, Russia  
16 – 22 September 2018**



**IEEE Catalog Number: CFP18Q47-POD  
ISBN: 978-1-5386-6892-4**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18Q47-POD
ISBN (Print-On-Demand):	978-1-5386-6892-4
ISBN (Online):	978-1-5386-6891-7

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

## Table of Contents

S1-O-030201	Realization of a Low Energy State of an Electron Beam in Uniform Channel <i>Mikhail Fuks, Nikolay Kovalev, Edl Schamiloglu</i>	1
S1-O-038801	3D Numerical Modeling of Ultrarelativistic Particle Beams with Crossing Angle <i>Marina Boronina, Vitaly Vshivkov</i>	5
S1-O-039501	High-Speed Surface Temperature Measurement in Ti-Coated Aluminum During Electron Beam Irradiation <i>Anton Teresov, Tamara Koval, Pavel Moskvin, Tran My Kim An, Nikolay Koval</i>	10
S1-O-040103	Table-Top Ion Implanter Based on Low-Voltage Vacuum Spark <i>Olga Shipilova, Victor Paperny, Vladimir Dresvyansky, Evgeny Martynovich, Alexandr Rakevich, Sergey Gorbunov, Nikolay Lebedev</i>	15
S1-O-049901	Ion Beams of Low-Pressure Glow Discharge in Transverse Supersonic Gas Flow <i>Danis Israphilov</i>	19
S1-O-050001	Challenges and Approaches to Radiation Hardness Control of Electronic Components to In-Space High-Energy Particles Exposure <i>Vasily Anashin, Pavel Chubunov, Aleksandr Koziukov, Aleksey Konyukhov, Grigory Protopopov</i>	23
S1-O-051703	Research of Energy Density for Pulsed Electron Beam of Wide Electron Kinetic Energy Spectrum <i>Ivan Egorov, Artem Poloskov, Maksim Serebrennikov, Asemgul Isemlerlinova</i>	27
S1-P-003803	Forevacuum Plasma Source of a Ribbon Electron Beam for Beam Plasma Generation <i>Aleksandr Klimov, Aleksey Zenin</i>	31
S1-P-010801	Plasma Optical System Based on an Anode-Layer Plasma Thruster for Intense Electron Beam Transport <i>Vasily Gushenets, Efim Oks, Alexey Bugaev</i>	35

S1-P-027201	Generation of Terahertz Radiation by Electron Beam-Plasma Interaction <i>Galina Dudnikova, Evgeny Berendeev, Anna Efimova, Vitaly Vshivkov</i>	39
S1-P-040501	Forevacuum Plasma Electron Source for Dielectric Surface Treatment <i>Aleksey Zenin, Ilya Bakeev, Yury Burachevsky, Aleksandr Klimov, Efim Oks, Yury Yushkov</i>	43
S2-O-001903	Computer Simulation of a Single-Torch System and the Interaction of the Several Capillary Torches <i>Victor V. Kuzenov, Sergei V. Ryzhkov, Konstantin V. Polyakov</i>	46
S3-O-008101	Measurements of Sub-Nanosecond Pulsed Electromagnetic Waves by Strip-Line Sensors with Long Transmitting Coaxial Cable <i>Vladimir M. Fedorov, Vasiliy Ye. Ostashev, Vladimir P. Tarakanov, Aleksander V. Ulianov</i>	51
S3-O-025404	Cherenkov Ka-Band Oscillator with 45% Efficiency of Beam-to-Microwave Power Conversion <i>Ruslan V. Tsygankov, Ivan K. Kurkan, Alexander V. Gunin, Ilya V. Romanchenko, Vladislav V. Rostov</i>	57
S3-O-025801	A High-Power Source of Ultrawideband Radiation with Reflector Antenna <i>Evgeny Balzovsky, Yury Buyanov, Vladimir Gubanov, Anatoly Efremov, Vladimir Koshelev, Eduard Nekrasov, Alexey Stepchenko</i>	61
S3-O-026302	Characteristics of an Ultrawideband 8×8 Array of Cylindrical Helical Antennas <i>Yury Andreev, Vladimir Koshelev, Sergey Smirnov</i>	66
S3-O-026304	Some Characteristics of Ultra-Wideband 2×2 Combined Antenna Array <i>Yury Andreev, Evgenii Balzovsky, Vladimir Kornienko, Yan-zhao Xie, Shao-fei Wang</i>	70
S3-O-026901	Bulk Resonances in Slow-Wave Structures with High Ratios of Diameter to Radiation Wavelength <i>Vadim Chazov, Michael Deichuly, Vladimir Koshelev</i>	74

S3-O-027301	Azimuthally Nonuniform Periodic Waveguides and Slow-Wave Structures for Generation of Linearly Polarized Radiation <i>Michael Deichuly, Vladimir Koshelev</i>	80
S3-O-028601	Nanosecond Front Dynamics and RF Oscillation Generation in a Transmission Line with Nonlinear Capacitors <i>Pavel V. Priputnev, Ilya V. Romanchenko, Vladislav V. Rostov, Oleg B. Kovalchuk, Valeriy V. Barmin</i>	85
S3-O-956001	Formation of Multi-Wave Coherent Radiation by Relativistic Electronic Flows in Oversize Electrodynamic Structures <i>Vladimir Cherepenin, Vladimir Kornienko, Vladimir Koshelev</i>	89
S3-P-007801	The Features of the Stress-Reaction to Repetitive Nanosecond Microwave Pulses <i>Knyazeva I.R., Medvedev M.A., Kutenkov O.P., Vasilev A.V., Gorokhovsky A.A., Rostov V.V.</i>	94
S4-O-003503	High-Power Capacitor-Switch Assemblies Rated at 100 ns <i>Ivan Lavrinovich, Denis Molchanov, Natalia Zharova</i>	98
S4-P-003502	Compact LTD Stage Based on a New Capacitor-Switch Assembly <i>Ivan Lavrinovich, Denis Molchanov, Dmitriy Rybka, Anton Artyomov</i>	103
S4-P-020301	A Submicrosecond High-Current Electron Beam Source with an Explosive-Emission Cathode and an Auxiliary Discharge Initiated by a Pre-pulse <i>Andrey Zherlitsyn, Nikolay Tsoy</i>	107
S4-P-020502	Peculiarities of Using the Charging Coils in Fast LTD Cavities <i>Vitaly Alexeenko, Sergey Kondratiev, Vadim Sinebryukhov, Sergey Volkov, Alexander Kim</i>	113
S4-P-020601	A Coupled-line Voltage Divider for Recording High-voltage Nanosecond Pulses <i>Anatolii Efremov</i>	117
S4-P-023101	A New Gas Switch for Low-Inductance Capacitor-Switch Assemblies <i>Denis Molchanov, Ivan Lavrinovich, Anton Artyomov, Dmitriy Rybka</i>	120

S4-P-025602	Statistical Regularity in LTD Technology <i>A.A. Kim, V.M. Alexeenko, S.S. Kondratiev, V.A. Sinebrukhov</i>	123
S4-P-046001	Effect of Electron-beam Polishing of Electrodes on Hold-off at Pulsed DC and Microwave Electric Fields in Vacuum <i>Alexander V. Batrakov, Ivan K. Kurkan, Evgeny V. Nefedtsev, Sergey A. Onischenko, Vladislav V. Rostov, Ruslan V. Tsygankov, Evgeny V. Yakovlev</i>	126
S4-P-046201	Impact of Snubber Circuit Inductance on Damping Late Currents in a Pulsed Power Circuit <i>Harpreet Singh Grover, Francis Dawson, Ed Williams</i>	130
S4-P-050801	Numerical Simulation of the Common Vacuum Diode Load of “Gamma-4” Facility <i>S.Yu. Puchagin, V.S. Gordeev, K.V. Strabykin, E.A. Chernyshev, R.P. Truntseva</i>	135
S4-P-050802	Predictions of Bremsstrahlung Dose Output of “Gamma-4” Facility <i>S.Yu. Puchagin, K.V. Strabykin, V.S. Gordeev, R.P. Truntseva, E.A. Chernyshev, A.N. Zalyalov</i>	138
S5-O-020702	Investigation of Arc Motion in Railgun Gas Switch in Oscillatory Regime of Discharge <i>Anatoliy Kharlov, Evgeny Kumpyak, Grigory Smorudov, Nikolai Tsoy</i>	142
S5-O-024801	Destruction Features of Steel Inductors with Nitrided Working Surface Under Strong Magnetic Field Generation <i>Alexey V. Spirin, Pavel A. Russkikh, Vasiliy I. Krutikov, Sergey N. Paranin, Dianna S. Koleukh</i>	148
S5-O-043601	Intensification of the Output of Chemical Elements from Ore in Conditions Gliding Discharge <i>Hongda Li, Sergei Sosnovskiy, Viktor Sachkov, Bolat Kudabayev, Mishik Kazaryan, Vitali Rozdolskiy</i>	154

S5-P-007001	Mitochondrial Membrane Permeability after Nanosecond Electromagnetic Pulsed Exposure <i>Loubov P. Zharkova, Ilya V. Romanchenko, Michael A. Buldakov, Pavel V. Priputnev, Michael A. Bolshakov, Vladislav V. Rostov</i>	158
S5-P-020303	Production of High-Purity Quartz Concentrate by Electrical Pulse Fragmentation <i>Ludmila Ananyeva, Sergey Ilenok, Mikhail Korovkin, Evgeniy Kumpyak, Andrey Zherlitsyn</i>	162
S5-P-046801	Triggered Spark Gap Switch with Gas Circulation for Repetitively Operated Multistage Marx Generator <i>Artem S. Yudin, Sergey S. Martemyanov, Andrey A. Bukharkin, Igor V. Bugaev, Evgeny G. Krastelev</i>	166
S6-O-018101	Surface of Plane Electrodes in Different Discharge Modes with Highly Inhomogeneous Electric Fields <i>Mikhail Shulepov, Mikhail Erofeev, Victor Tarasenko, Vasili Ripenko, Svetlana Zatsepina, Alexei Trenkin, Vladimir Karelkin, Kseniya Almazova, Artem Belonogov, Valerii Borovkov, Evgenii Gorelov, Igor Morozov, Sergey Haritonov</i>	170
S6-O-018806	The Influence of Frequency and Voltage to Apokamp Discharge Dynamics at Moderate Pressures <i>Evgeni Bakht, Victor Skakun, Victor Tarasenko, Eduard Sosnin, Victor Panarin, Vladimir Kuznetsov</i>	176
S6-O-041101	Ionization Processes with Participation of Runaway Electrons in a Gas Diode with a Strongly Nonuniform Electric Field <i>Sergey A. Barenholts, Gennady A. Mesyats, Michael I. Yalandin, Nikolay M. Zubarev, Olga V. Zubareva</i>	179
S6-P-003603	Excitation of Diamonds by a Subnanosecond Runaway Electron Beam with an Electron Energy of up to 200 keV Generated in a Nanosecond Gas Discharge <i>Dmitry Beloplotov, Mikhail Lomaev, Victor Tarasenko, Evgeny Lipatov, Dmitry Sorokin</i>	185
S6-P-010503	Luminescence of Crystals Excited by a Excilamps <i>Victor F. Tarasenko, Evgeniy I. Lipatov, Dmitry E. Genin</i>	190

S6-P-013309	Subnanosecond Breakdown in the Strongly Overvoltaged Gap: Simulation and Experiment <i>Dmitry Beloplotov, Anton Grishkov, Dmitry Sorokin, Valery Shklyaev, Victor Tarasenko, Mikhail Lomaev</i>	194
S6-P-013801	Theoretical Modelling of Fast Atmospheric Pressure Discharge in Gas Diode with Plane-Grid Cathode System <i>Aleksandr Kokovin, Vasily Kozhevnikov, Andrey Kozyrev, Natalia Semeniuk, Viktoria Goliak</i>	200
S6-P-015101	Formation of 1.4-MeV Runaway Electrons Flow in Air <i>A.G. Sadykova, M.S. Pedos, S.N. Rukin, V.V. Rostov, I.V. Romanchenko, A.F. Sadykov, K.A. Sharypov, V.G. Shpak, S.A. Shunailov, M.R. Ul'masculov, M.I. Yalandin</i>	204
C1-O-929001	Energy Spectrum of an Electron Beam Outputted into Ambient Air on an Electron Accelerator with a Grid Plasma Cathode <i>M.S. Vorobyov, E.Kh. Baksht, N.N. Koval, V.F. Tarasenko, A.V. Kozyrev, S.Yu. Doroshkevich</i>	209
C1-P-037602	Generation of Plasma by Vacuum Arc with Copper-Chromium Cathode <i>Valeria Frolova, Alexey Nikolaev, Efim Oks, Georgy Yushkov</i>	214