

Resume of Rashid A. Ganeev

Professor Rashid Ashirovich Ganeev was born in Tashkent (Uzbekistan) on 18 January 1955. Currently, he is a citizen of Russian Federation. Presently, Prof. Ganeev works at the University of Latvia, Riga, Latvia. He is married, has two children.



Education Background

1972 – 1977, Tashkent Polytechnic Institute, Department of Physical Engineering, Tashkent, USSR. Undergraduate and graduate study. M.Sci. diploma of engineer – physicist.

1984 – 1987, Institute of Electronics, Tashkent, USSR. Postgraduate and Ph.D. study. Ph.D. diploma in Physics and Mathematics (1987).

Scientific employments and academic responsibilities

Institute of Electronics, Tashkent, USSR; Staff Engineer, Research Fellow, Oct. 1976 – Jan. 1993

Scientific Association Akadempribor, Tashkent, USSR, Uzbekistan; Principal Scientist, Jan. 1993 – Mar. 2009

Standards and Industrial Research Institute of Malaysia, Shah Alam, Malaysia; Visiting Researcher, Mar. 1997– Feb. 1998

Centre for Advanced Technology, Indore, India; Visiting Fellow, Senior Visiting Researcher, Visiting Professor, Mar. 1999 – May 1999, Oct. 1999 – Dec. 1999, Jan. 2006 – Mar. 2006, Feb. 2009 – Mar. 2009, Feb. 2010 – Mar. 2010

University of Tokyo, Kashiwa, Japan; Foreign Research Fellow, Visiting Professor, Sep. 2000 – Sep. 2001, Nov. 2002 – May 2005, Feb. 2007 – Dec. 2007, Nov. 2008 – Jan. 2009

International Centre for Theoretical Physics, Trieste, Italy; Senior Associate, Feb. 1994 – Mar. 1994, Sep. 2005 – Oct. 2005, Aug. 2009 – Sep. 2009, May 2010 – June 2010

Institut National de la Recherche Scientifique, Montreal, Canada; Visiting Researcher Sep. 2006 – Dec. 2006, May 2008 – Nov. 2008

Imperial College, London, United Kingdom; Visiting Researcher, Nov. 2010 – Oct. 2012

Institute of Ion, Plasma, and Laser Technologies, Tashkent, Uzbekistan; Principal Scientist, Nov. 2012 – Mar. 2013, Apr. 2014 – Sep. 2014

Westfälische Wilhelms Universität, Muenster, Germany; Visiting Researcher, Jun. 2010, Sep. 2011, Feb. 2012

Instituto de Química Física Rocasolano, Madrid, Spain; Visiting Researcher, Feb. 2011, Oct. 2011

Saitama Medical University, Moroyama, Japan; Professor, Apr. 2013 - Mar. 2014, Oct. 2014 - Oct. 2015

Voronezh State University, Voronezh, Russia; Professor, Apr.2012 - Aug. 2014, Apr. 2016 – Aug. 2017, Jan. 2019 – Mar. 2019

Changchun Institute of Optics, Fine Mechanics and Physics, Changchun, China; Professor, Aug. 2017 – Dec. 2018

American University of Sharjah, Sharjah, United Arab Emirates, Visiting Professor, Apr. 2019 – Dec. 2020

University of Latvia, Riga, Latvia, ERA Chair, Oct. 2020 – present

Grants and nominations

1994, awarded by the International Science Foundation Grant; 1997, awarded by The World Academy of Sciences (TWAS) Associateship Scheme Grant; 2000, awarded by the COE Grant of the Ministry of Sciences and Technology of Japan; 2004, nominated a Visiting Professor of the Tokyo University, Japan; 2004, awarded by the International Center of Theoretical Physics Senior Associateship Grant; 2006, awarded by Fond Quebecois sur la Recherche de la Nature et Technologies; 2006, awarded by the Japan Society for the Promotion of Science Grant; 2007, nominated a Visiting Professor of the Tokyo University, Japan; 2009, awarded by the TWAS-UNESCO Associateship Grant; 2010, awarded by TWAS Research Grant; 2010, awarded by Marie Curie International Incoming Fellowships Grant; 2011, awarded by Volkswagen Grant; 2012, nominated a Professor of Voronezh State University, Russia; 2013, nominated a Professor of Saitama Medical University, Japan; 2013, awarded by TWAS Research Grant; 2015, awarded by the Japan Society for the Promotion of Science Grant; 2016, awarded by Russian Ministry of Science and Education grant; 2017, nominated a Professor of Changchun Institute of Optics, Fine Mechanics and Physics, China; 2017, awarded by Russian Fund of Basic Research grant; 2017, awarded by Center of Advanced Studies program of Ludwig-Maximilians-Universität München, Germany; 2018, awarded by Chinese Academy of Sciences President's International Fellowship Initiative; 2018, awarded by High-End Foreign Expert Program Grant (China); 2019, awarded by the grant of American University of Sharjah (UAE); awarded by European Research Area the position of ERA Chair in the University of Latvia.

Main topics of scientific interests

Nonlinear optics; Investigation and construction of coherent extreme ultraviolet radiation sources; Laser – surface interactions; Nanofabrication and characterization of small-sized species.

A brief account of scientific activity

Prof. Ganeev has initiated the systematic studies of the nonlinear optical properties of various media. The nonlinear optical parameters (nonlinear refractive indices, nonlinear susceptibilities, multi-photon and saturated absorption coefficients, etc.) of colloidal metal solutions, metal-doped organic polymers, low-excited plasmas, semiconductor chalcogenide films and solutions, dye vapors and solutions, metal-doped glasses and polymers, nonlinear crystals, liquids, fullerenes, fullerene-doped organic films, etc., have been analyzed. The optical limiting in fullerene-doped solutions, colloidal metals and semiconductors was achieved. The studies of the low-order harmonic generation of picosecond laser radiation in colloidal

metals, metal-doped organics and glasses, fullerenes, dye vapors and solutions were carried out, and their nonlinear susceptibilities were analyzed in the frames of the influence of self-action processes on the harmonic generation. The low-order harmonic generation in dye vapors caused by the difference frequency generation was achieved. The nanorippling formation in different materials was studied.

Prof. Ganeev has established his methods to perform the high-order harmonic generation in laser ablation plumes from various solid targets through the collaboration with a number of leading laboratories. This has allowed him to study, in well-controlled samples, high-order harmonic generation of laser radiation from a variety of atoms and ions of for instance a broad range of metals and organics. Through this he has been able to demonstrate strong resonant enhancement at particular harmonic orders due to the effects of resonance on phase matching. More recently he has shown that nanoparticles and fullerenes can, under the correct illumination conditions, be lifted from surfaces without fragmentation from a surface and form a gaseous plume of high density and purity. For instance he has shown this for 10-nm clusters of Ag, Pt, and Au and found evidence of enhanced harmonic generation. He has also performed the first ever harmonic generation experiments using the carbon-contained clusters (C₆₀, carbon nanoparticles, graphene, carbon fibers, and carbon nanotubes), which allowed achieving the efficient conversion efficiency of laser radiation in the extreme ultraviolet range. He has developed new methods of quasi-phase-matching in multi-jet plasmas allowing the enhancement of the groups of harmonics in the extreme ultraviolet range and the definition of the electron density in plasmas. Among his other achievements are the development of various methods of harmonic stabilization using the rotating targets during laser ablation using high pulse repetition rate lasers, characterization of plasma parameters, laser ablation induced high-order harmonic generation spectroscopy, analysis of DNA components and various complex organic materials through the ablation and nonlinear optical study of plasma plumes, application of mid-infrared pulses for the amendment of plasma harmonics, application of extended laser-produced plasmas for efficient harmonic generation, quasi-phase matching in plasma plumes, etc. Prof. Ganeev has established the network on plasma harmonic studies with numerous scientists in Japan, India, Canada, Bosnia and Herzegovina, Russia, Germany, United Kingdom, Malaysia, Italy, China, Spain, China, UAE, etc.

He has published eight monographs based on his studies of the low- and high-order nonlinear optical properties of various materials. Prof. Ganeev is the first co-author of most of his 400+ publications in peer-reviewed journals. His *h*-index is 45 (Web of Science, 2019).

Additional information

Awards

		Awarding organization	Year	Achievement for which the award was received
1	ICO Galileo Galilei Award and Medal	Annual award of International Commission for Optics	2002	Achievements in nonlinear optical studies http://e-ico.org/activities/awards#nom
2	Appointment for TWAS fellowship	The World Academy of Sciences	2008	For achievements of optics developments https://twas.org/directory/ganeev-rashid?destination=user
3	Khwarizmi International Award	Iranian Research Organization for Science and Technology	2011	New approaches in creation of ultra-short sources of laser radiation http://kia-kahroba.ir/laureates/en/winners

Experience in guiding the academic teams

1. Organization of research of lower-order optical nonlinearities of various materials (Institute of Electronics, Tashkent, USSR, Uzbekistan, 1985-1997).
2. Leadership of a group of researchers on laser hardening of steels, applications of low-power lasers for postoperative therapy, holographic research, etc. (Standards and Industrial Research Institute of Malaysia, Shah Alam, Malaysia, 1997– 1998).
3. The group leader of the researchers studying the processes occurring in a laser plasma (Centre for Advanced Technology, Indore, India, Mar. 1999 – May 1999, Oct. 1999 – Dec. 1999, Jan. 2006 – Mar. 2006, Feb. 2009 – Mar. 2009, Feb. 2010 – Mar. 2010).
4. Team management in the development of x-ray studies of various plasma formations, as well as the first experiments with plasma harmonics (University of Tokyo, Institute of Solid State Physics, Kashiwa, Japan, Sep. 2000 – Sep. 2001, Nov. 2002 – May 2005, Feb. 2007 – Dec. 2007, Nov. 2008 – Jan. 2009).
5. The joint leadership of a group studying the resonant processes and their influence on the efficiency of harmonics generation in plasma (Institut National de la Recherche Scientifique, Montreal, Canada, Sep. 2006 – Dec. 2006, May 2008 – Nov. 2008).
6. Formation and management (in the framework of Marie Curie Grant) of the research center on the applications of nanoparticles to create a laser plasma allowing to increase the conversion of IR radiation in the extreme ultraviolet range (Imperial College, London, United Kingdom, Nov. 2010 – Oct. 2012).
7. Management of the laboratory in the studies of the nonlinear absorption and nonlinear refraction of materials (Institute of Ion, Plasma, and Laser Technologies, Tashkent, Uzbekistan Nov. 2012-Mar. 2013, Apr. 2014 – Sep. 2014).
8. Management of a group of graduate students on the applications of high pulse repetition rate lasers to create optimal methods for stabilizing various parameters of laser plasma in the framework of the Volkswagen program (Westfälische Wilhelms Universität, Muenster, Germany, Jun. 2010, Sep. 2011, Feb. 2012).
9. Leadership of the group for the development of techniques for quasi-phase matching in laser plasma (Saitama Medical University, Moroyama, Japan, Apr. 2013-Mar. 2014, Oct. 2014 - Oct.2015).

10. Management of nonlinear optical research in the group of optics and spectroscopy (Voronezh State University, Voronezh, Russia, Apr. 2012-Aug. 2014, Apr. 2016 – Aug. 2017).
11. Management of the center for nonlinear optics (Changchun Institute of Optics, Fine Mechanics and Physics, Changchun, China, Aug. 2017 – Dec. 2018).
12. Guidance of the group on using 100 kHz laser to generate harmonics in gases and laser plasma (American University of Sharjah, Sharjah, United Arab Emirates, Apr. 2019 – Dec. 2020).
13. Guidance of the team of ERA Chair in the area of quantum optics and photonics (University of Latvia, Riga, Latvia, Nov. 2020 – present).

Practical applications of research

1. Development of laser systems for measuring the distance to satellites
2. Laser welding of dental prostheses
3. Therapy using low-power gas lasers
4. Laser hardening of metals
5. Increasing the water repellency of materials during laser nanostructuring
6. Laser marking of various materials, etc.
7. Nanostructuring of metals for color variations.

Monographs of Prof. Ganeev



Projects under supervision of Prof. Ganeev during last 10 years

	Project	University hosting the project	Source of funding	Years
1	Nonlinear optical properties of various plasma plumes at the conditions of the use of high pulse repetition rate lasers	Imperial College, London, United Kingdom	UNESCO, Marie Curie grant	2010 - 2012
2	Cluster ablation using 1 kHz laser for the formation of efficient medium for the frequency conversion of laser radiation	Westfälische Wilhelms Universität, Muenster, Germany	Volkswagen	2011 - 2013
3	Frequency conversion of picosecond pulses in plasmas	Institute of Ion, Plasma, and Laser Technologies, Uzbekistan	UNESCO	2011 - 2013
4	High-order harmonic generation in extended plasma formations	Saitama Medical University, Japan	Japanese Society for the Promotion of Science	2013 - 2015
5	Research of nonlinear optical properties of dyes and plasmon nanoparticles	Voronezh State University, Voronezh, Russia	Ministry of science and higher education	2017-2019
6	“One Thousand Talents Program,” project on the nonlinear optics	Changchun Institute of Optics, Fine Mechanics and Physics, China	The State Administration, China	2018
7	Implementation of the high-order harmonic generation of ultrashort laser pulses in laser-produced plasmas	Changchun Institute of Optics, Fine Mechanics and Physics, China	Academy of Sciences of China	2018

8	High-order harmonics generation using quantum dots	Voronezh State University, Russia	Russian Foundation for the Basic Research	2017-2019
9	Advanced methods of optical studies in AUS and development of novel sources of coherent extreme ultraviolet radiation	American University of Sharjah, UAE	Ministry of Education of United Arab Emirates	2019- 2020
10	Development of quantum optics and photonics at the University of Latvia	University of Latvia, Latvia	European Research Area	2020-present

International cooperation experience

	Foreign organization	Direction of cooperation	Years of cooperation
1	Standards and Industrial Research Institute of Malaysia	The studies of holography, laser marking, laser hardening, and low level laser therapy	1997-1998
2	Centre for Advanced Technology, India	Analysis of even and odd harmonics of laser radiation from various surfaces	1999,1999, 2006,2009, 2010
3	University of Sarajevo, Bosnia and Herzegovina	Joint experimental and theoretical studies of resonance processes	2008, 2016
4	Institute of Technology and Science, India	Studies of the growth and nonlinear refraction and absorption in Mg doped LiNbO3 single crystals	2009
5	National Institute of Technology, India	Synthesis and photoluminescence properties of silver nanowires	2010
6	Sincrotrone Trieste, Italy	Endohedral fullerenes: A way to control resonant high-order harmonic generation	2011
7	Leibniz Universität Hannover, Germany	Theoretical and experimental studies of isolated sub-fs XUV pulse generation in Mn plasma ablation	2012
8	University of Palermo, Italy	Joint studies of high-order harmonic generation in fullerenes using few- and multi-cycle pulses of different wavelengths	2013, 2015
9	Moscow State University, Russia	High-order harmonic cut-off frequency in atomic silver irradiated by femtosecond laser pulses: theory and experiment	2013, 2019
10	International Centre for Theoretical Physics, Italy	Senior Associateship in the field of optics	2005, 2009,2010
11	Westfälische Wilhelms Universität, Germany	Resonant and non-resonant high-order harmonic generation in plasmas produced by 1 kHz picosecond and femtosecond pulses	2010-2015, 2018
12	Instituto de Química Física Rocasolano, Spain	Characterization of laser-induced plasmas of nucleobases: Uracil and thymine	2011-2014
13	General Physics Institute of RAS, Russia	Comparative studies of resonance enhancement of harmonic radiation in indium plasma using multicycle and few-cycle pulses	2013- 2019
14	NIIMT, Romania	Influence of ablated and tunneled electrons on quasi-phase matched high-order-harmonic generation in plasma	2015
15	Institute of Applied Physics, Russia	Two-color high-harmonic generation in plasmas: efficiency dependence on the generating particle properties	2016
16	Max Born Institute, Germany	Application of mid-infrared pulses for quasi-phase matching of high-order harmonics in silver plasma	2016
17	Wuhan Institute of Technology, China	Indium plasma in single- and two-color mid-infrared fields: Enhancement of tunable harmonics	2016
18	University of Crete, Greece	Femtosecond laser-induced surface structuring for oil–water separation	2019
19	University of Kassel, Germany	Pulse duration and wavelength effects of laser ablation on the oxidation, and aging of aluminum nanoparticles in water	2019
20	Moscow Institute of Physics and Technologies, Russia	Characterization of the nonlinear optical properties of synthesized quantum dots	2020
21	The University of Latvia, Latvia	Developments of different aspects of quantum optics and photonics	2021