

# Dr. Stefan Karatodorov

## Address:

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## Professional Data

### Education

- Doctor of Philosophy (Ph.D.), Physics of Wave Processes  
Thesis title: Combined Plasma Source for Emission Spectroscopy:  
Laser-induced Plasma in Hollow Cathode Discharge, 2012 – 2017
- Master's Degree, Quantum Electronics and Laser Technology, 5. (grade average and thesis defense), Sofia University St. Kliment Ohridski, 2009 – 2011
- Bachelor's Degree, Engineering Physics, 5.66 (grade average and thesis defense)  
Sofia University St. Kliment Ohridski, 2005 – 2009
- Natural Sciences and Mathematics High School, Haskovo, 2000 - 2005

### Work Experience

- 2017 November – present, Chief Assistant Professor at Institute of Solid State Physics, Bulgarian Academy of Sciences
- 2016 May – June, Short-term specialization at Eindhoven University of Technology  
Research: Computer model of a combined plasma source laser ablation-hollow cathode discharge using the Plasimo simulation platform  
Collaborators: Dr. Diana Mihailova and Dr.ir. Jan van Dijk
- 2015 November – December Short term specialization at Eindhoven University of Technology  
Research: Fluid model of the plasma discharge of CO<sub>2</sub> laser used for photolithography  
Collaborators: Dr. Diana Mihailova and dr.ir. Jan van Dijk
- 2015 April – June Short term specialization at Eindhoven University of Technology  
Research: Plasma modeling and performing numerical simulations of laser ablation

hollow cathode discharge, a potential plasma source for thin film deposition

Collaborators: Dr. Diana Mihailova and Dr.ir. Jan van Dijk

- 2015 – 2016, Assistant Researcher at Institute of Solid State Physics, Bulgarian Academy of Sciences
- 2011 March – May Short term specialization at Eindhoven University of Technology  
Research: Monte Carlo modeling of electron behaviour in hollow cathode discharge for laser applications – work on Master Diploma Thesis  
Collaborators: Dr. Diana Mihailova and dr.ir. Jan van Dijk
- 2009 April – June Erasmus grant for a stay at Eindhoven University of Technology  
Research: Hollow cathode lasers with metal vapour: Application of the Monte Carlo method for analysis of the discharge – work on Bachelor Diploma Thesis

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### **Projects work:**

- Competition for Financial Support of Research Projects – 2017, Bulgarian National Science Fund – December 2017 – ongoing  
Title: Experimental and theoretical study of sub-picosecond laser-induced ultrafast dynamical processes in wide band gap semiconductors nanomachining
  - BAS Programme for Support of Young Scientist and Ph.D. students 2017, August 2017 – ongoing  
Title: New plasma source for elemental analysis of solid materials – laser ablation in hollow cathode glow discharge – project leader
  - Project EU FP7 Security 312804 2013-2017  
Title: COUNTERFOG – Device for Large Scale Fog Decontamination  
September 2016 – October 2017
  - Exchange on Bilateral Agreement with Polish Academy of Sciences 2015-2017  
Title: Applications of Femtosecond Lasers
  - Project EU FP7 Nanosciences, Nanotechnologies, Materials and New Production Technologies NMP REGPOT-2012-2013-1  
Title: Research and Innovation Capacity Strengthening of ISSP-BAS in Multifunctional Nanostructures, February 2015 – June 2016
  - Project “Young Scientists” 2011 DMU 03/126-12.12.2011, National Science Fund  
Title: Laser-induced fluorescence analysis for research and restoration of cultural heritage
  - Project “Young Scientists” 2011 DMU 03/3-11.12.2011, National Science Fund  
Title: Gilding techniques in artifacts from Ancient Thracia. Physical methods for analysis
  - Project “Young Scientists” 2011 DMU 03/037-13.10.2011, National Science Fund  
Title: Novel Experimental Methods for Evaluation of the concentration of radioactive noble gases in the environment and in archaeological artifacts
  - Bilateral Cooperation with Romania DO 02/20-01.10.2010, National Science Fund  
Title: Standardization of laser techniques for research and restoration of cultural heritage
  - Project DO 02-374/08.12.2008, Bulgarian National Science Fund  
Title: Laser Methods for Diagnostics in Archaeology
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## Publications:

1. Experimental demonstration of efficient and robust second harmonic generation using the adiabatic temperature gradient method  
E Dimova, V Stefleková, S Karatodorov and E Kyoseva  
Journal of Physics: Conf. Series 992 (2018) 012007 ([download](#))
2. Elemental composition and structural characteristics of as-received TriTanium™ orthodontic archwire  
I Ilievska, V Petrov, V Mihailov, S Karatodorov, L Andreeva, A Zaleski, V Mikli, M Gueorgieva, V Petrova and A Stoyanova-Ivanova  
Journal of Physics: Conf. Series 992 (2018) 012036 ([download](#))
3. Formation of metastable phases of ferrous sulfide via pulsed Nd:YAG laser deposition: Experimental and theoretical study  
T Krenek, R Medlna, S Karatodorov, V Mihailov, M Pola, A.H.Reshak.  
Journal of Alloys and Compounds, 2014, 723 (2017): 689-697.  
IF 3.113 ([download](#))
4. Novel Electromagnetic Sensor for Contaminations in Fog Based on the Laser-induced Charge Effect  
O Ivanov; S Karatodorov; J L Pérez Diaz  
2017 DOI: 10.1109/ICSSENS.2017.8234379 ([download](#))
5. Pulsed Nd:YAG deposition of nanostructured FeS 1-x containing meta-stable phases.  
T Krenek, S Karatodorov, R Medln, V Mihailov, J Savkova  
2017 IOP Conf. Ser.: Mater. Sci. Eng. 175 012022 ([download](#))
6. Structural and morphological characterization of ternary nanocrystalline Cu-In-S thin films prepared by laser ablation.  
I Bineva, B Pejova, V Mihailov, A. Dinescu, M Danila, S Karatodorov  
Journal of Physics Conference Series 794(1):012019 ([download](#))
7. The Effect of Process Parameters in Femtosecond Laser Micromachining.  
Garasz K., Tanski M., Kocik M., Iordanova Å., Yankov G., Karatodorov S., Grozeva M.  
Bulg. J. Phys 43 92016, 110-120, 43, 2, 2016 ([download](#))
8. Optical emission spectroscopy of plasma produced by laser ablation of iron sulfide.  
Karatodorov S., Mihailov V., Krenek T., Grozeva M.  
J. Phys.: Conf. Ser., 700, IOP Publishing, 2016,  
DOI:10.1088/1742-6596/700/1/012001, 012001 ([download](#))
9. Analysis of elemental composition of a heat activated, multi-force, nickel titanium orthodontic archwire.  
Petrunov, V. I, Andreeva, L. S., Karatodorov, S. I., Mihailov, V. I., Terzieva, S. D., Ilievska, I., Stoyanova-Ivanova, A. K., Tumbalev, V. G., Mikli, V.  
Bulgarian Chemical Communications, 47, 1, 2015, ISSN:0324- 1130, 229-233.  
IF:0.349 ([download](#))
10. Laser-Induced Fluorescence Spectroscopy - a Contemporary Approach to Cultural Heritage.  
V Atanassova, S Karatodorov, G Yankov, P Zahariev, E Tsvetkova  
Advances in Bulgarian Science, National Centre for Information and Documentation, 2014, ISSN:1312 6164, 5-10 ([download](#))

11. Monte Carlo simulation of a sputtering hollow-cathode discharge for laser applications  
S Karatodorov, D Mihailova, J van Dijk, J van der Mullen and M Grozeva  
J. Phys.: Conf. Ser. 516 012019 2014 ([download](#))
  12. Influence of low-pressure glow discharge on laser-induced plasma spectra  
S Karatodorov, V Mihailov and M Grozeva  
J. Phys.: Conf. Ser. 514 012044 2014 ([download](#))
  13. Emission characteristics of laser ablation-hollow cathode glow discharge spectral source  
S Karatodorov, V Mihailov and M Grozeva  
Open Chemistry Volume 13, Issue 1, 2014  
IF 1.329 ([download](#))
  14. A novel design of a laser-ablation hollow cathode discharge for elemental analysis  
S Karatodorov, V Steflekova, V Mihailov, D Mihailova, J van Dijk, M Grozeva  
and P Zahariev  
11th Kudowa Summer School, Towards Fusion Energy Kudowa Zdroj, June 11-15, 2012  
([download](#))
  15. Monte Carlo simulation of electron kinetics in a hollow cathode discharge  
S. Karatodorov, D. Mihailova, J. van Dijk, J. van der Mullen and M. Grozeva  
J. Phys.: Conf. Ser. 356 012043 2012 ([download](#))
  16. Geometrical features in longitudinal sputtering hollow cathode discharges for  
laser applications  
D Mihailova, J van Dijk, G J M Hagelaar, S Karatodorov, P Zahariev, M Grozeva and  
J J A M van der Mullen J. Phys. D: Appl. Phys. 45 165201 2012  
IF 2.544 ([download](#))
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## Computer Skills

- Linux/Unix
- Computer Networks
- OriginLab, LabView
- Latex, MS Office, CorelDraw
- C++

## Teaching

February 2018 – present Teaching of High School level Physics Course in Private High School “Educational Technologies”, Sofia, Bulgaria  
Supervisor of one Bachelor Thesis Diploma

## Awards and Nominations

- 2017, Most Significant Applied Science Achievement of Institute of Solid State Physics for 2017 for “SPCE sensor with liquid layer for contamination in fog”, member of the awarded team of Assoc. Prof. Ognyan Ivanov
- 2016, Best poster award at 13th European Workshop on Laser Ablation (EWLA2016), July 12-15, 2016 in Ljubljana, Slovenia

- 2012, Nomination for "Academician Ivan Evstratiev Geshov" award by Institute of Solid State Physics for a youngest scientist of the Bulgarian Academy of Sciences in the field of "nanosciences, new materials and technologies"

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## Conferences

- The First International Scientific Conference on Security, Borovets, Bulgaria, December 2017 (talk)
- IEEE Sensors 2017, Glasgow, United Kingdom, November 2017 (poster)
- 20th International Summer School on Vacuum Electron and Ion Technologies, Sozopol, Bulgaria, September, 2017 (2 posters)
- Fifth International Scientific and Technical Conference on Engineering, Technologies, Education and Security, Veliko Tarnovo, Bulgaria, May 2017 (talk)
- 13th European Workshop on Laser Ablation (EWLA2016) Ljubljana, Slovenia July 2016 (poster)
- Light in Nanoscience and Nanotechnology, Hissar, Bulgaria, October 2015 (talk)
- Laser and Plasma matter interaction, Plovdiv, Bulgaria November.2015 (poster)
- 19th International Summer School on Vacuum, Electron and Ion Technologies, September .2015., Sozopol, Bulgaria (talk and poster)
- International School of Atomic and Molecular Spectroscopy Nano-Optics: Principles Enabling Basic Research and Applications, Erice, Sicily, Italy July 2015 (poster)
- 18th International School on Quantum Electronics, Sozopol, Bulgaria, October 2014 (poster)
- Fourth Balkan Symposium on Archaeometry, Nessebar, Bulgaria, September 2014
- Satellite Workshop of the 18th International School on Condensed Matter Physics, Varna, Bulgaria, September 2014 (talk)
- 26th Symposium on Plasma Physics and Technology, Prague, Czech Republic, June 2014 (poster)
- 18th Summer School on Vacuum, Electron and Ion Technologies (VEIT), Sozopol, Bulgaria, October 2013 (talk)
- Second National Congress of Physics, Sofia, Bulgaria, September 2013 (talk)
- 5th Central European Symposium on Plasma Chemistry Balatonalmadi, Hungary, August 2013 (talk).
- European Working Group for Glow Discharge Spectroscopy (EW-GDS), London, United Kingdom, September 2012 (poster)
- Third Balkan Symposium on Archaeometry The Unknown Face of the Artwork, Bucharest, Romania, October 2012 (poster)
- 5th International Workshop & Summer School on Plasma Physics, Kiten, Bulgaria, June.2012 (poster)

- Charisma Summer School Advanced laser-based techniques in art conservation, diagnostics and analysis, Heraclion, Crete, Greece, June 2012 (poster)
  - 11th Kudowa Summer School, "Towards Fusion Energy" Kudowa Zdroj, Poland, June 2012 (talk)
  - 23rd NNV-symposium Plasma Physics & Radiation Technology, Lunteren, The Netherlands, March 2011 (poster)
  - Conservation-Restoration Conference - CONScience New techniques and solutions in heritage conservation and restoration, Bucharest, Romania, 2011 (poster)
  - 17th International Summer School on Vacuum, Electron and Ion Technologies, Sunny Beach, Bulgaria 2011 (poster)
  - Advanced Laser Technologies, Golden Sands, Bulgaria 2011 (poster)
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