

Chavdar Dutsov

PhD

Zürich, Switzerland
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Personal Information

Date of Birth 2 October 1993
Nationality Bulgarian
Current work Postdoctoral Fellow at the [Paul Scherrer Institute](#)
Work Address Forschungsstrasse 111, 5232 Villigen PSI
Websites [Google Scholar](#), [Scopus](#), [Personal website](#)

Work Experience

- Mar 2022 — present
PSI, Switzerland **Postdoctoral Fellow**
[Muon Physics Group](#), Laboratory for Particle Physics, PSI
- Analysis of systematic effects for the muonEDM experiment
 - Monte Carlo simulations
- Jun — Dec 2019
Sep 2020 — Jan 2021
Saclay, France **Collaborator at CEA Saclay, French National Laboratory “Henri Becquerel”**
- Development and testing of a Time-to-Digital Converter system with 200 ps timing resolution
 - Development and testing of a detector for coincidences between γ -rays & scintillation events
 - Studies on liquid scintillation counting with fast digitizers for the purposes of radionuclide metrology with the TDCR method
- Jun 2018 — Sep 2021
Sofia, Bulgaria **Physicist at the Metrology of Ionizing Radiation laboratory**
Department of Atomic Physics at Sofia University “St. Kliment Ohridski”
- Co-supervision and working with Master and Bachelor students
 - Development and characterization of scintillation detectors
 - Standardization of radionuclides
 - Data analysis, software development and support

Education

- Jun 2018 — Sep 2021 **PhD candidate**
Sofia University, Faculty of Physics, Department of Atomic Physics
Sofia, Bulgaria Thesis title: “*Study on the applications of the Triple-to-Double Coincidences Ratio method for primary activity standardization using liquid scintillation counting*”
- detector development, including acquisition electronics and software
 - primary radioactivity measurements using liquid scintillation counting
 - development of digital acquisition techniques with picosecond timing resolution
- 2016 — 2018 **Master’s degree in Medical Physics**
Sofia, Bulgaria Sofia University, Faculty of Physics, Department of Atomic Physics
- 2012 — 2016 **Bachelor’s degree in Medical Physics**
Sofia, Bulgaria Sofia University, Faculty of Physics, Department of Atomic Physics
- 2007 — 2012 **Secondary Education**
Sofia, Bulgaria National High School of Mathematics and Science, Bulgaria
Profile: Physics and Astronomy

Languages

English, Level: C1 – C2

Certificates: IELTS, TOEFL, SAT

French, Level: A2

German, Level: A2

Italian, Level: A2

Bulgarian — native

Computer skills

- Programming languages **Python** (Data handling: *NumPy, SciPy, Pandas*; Data visualisation: *Matplotlib*; Experience with making graphical software and web based applications for data analysis); [click here](#) for example code
- C, C++, Rust** Capable of writing larger projects; [click here](#) for example code
- GNU/Linux** Over 8 years experience in shell scripting, process automation, system management, classic software (Vim, ssh, bash, sed, awk, etc.)
- Good practice with **Fortran** (77, 90, 95) for mathematical purposes
- Experience with **VHDL** for **FPGA** programming
- Experience in parallelization with **OpenMP** and **MPI**
- Software **Wolfram Mathematica** Experience with numerical and symbolic equation solving
- KiCAD** for the design of printed circuit boards — good level
- FreeCAD** for the design of 3D models — good level
- Simplify3D, Repetier** for 3D printing — very good level
- good writing skills in \LaTeX
- experience with Xilinx FPGA IDE and Arduino IDE
- Methodologies Experience with **Monte Carlo** simulations — development of a custom code for the simulation of the time spread of detected scintillation photons

Selected publications

K. Mitev, C. Dutsov, P. Cassette, and B. Sabot, “Time-domain based evaluation of of detection efficiency in liquid scintillation counting”, [Scientific Reports](#), [Nature](#)

Research **11**, 12424 (2021).

C. Dutsov, P. Cassette, B. Sabot, and K. Mitev, “Evaluation of the accidental coincidence counting rates in TDCR counting”, [Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment](#) **977**, 164292 (2020).

C. Dutsov, B. Sabot, P. Cassette, and K. Mitev, “Measurement of the half-life of excited nuclear states using liquid scintillation counting”, [Applied Radiation and Isotopes](#) **176**, 109845 (2021).

C. Dutsov, P. Cassette, K. Mitev, and B. Sabot, “In quest of the optimal coincidence resolving time in TDCR LSC”, [Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment](#) **987**, 164846 (2021).

C. Dutsov, K. Mitev, P. Cassette, and V. Jordanov, “Study of two different coincidence counting algorithms in TDCR measurements”, [Applied Radiation and Isotopes](#) **154**, 108895 (2019).

V. Jordanov, P. Cassette, **C. Dutsov**, and K. Mitev, “Development and applications of a miniature TDCR acquisition system for in-situ radionuclide metrology”, [Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment](#) **954**, 161202 (2020).

K. Mitev, P. Cassette, V. Jordanov, H. R. Liu, and **C. Dutsov**, “Design and performance of a miniature TDCR counting system”, [Journal of Radioanalytical and Nuclear Chemistry](#) **314**, 583–589 (2017).

Full list of publications can be found on: [Google Scholar](#) or [Scopus](#)

Scientific Projects

- Mar 2022 — present
PSI, Switzerland
- Systematic effects in Electric Dipole Moment searches**
- Analytical description of the systematic effects in the experiment for the search of the muon EDM
- Jan 2020 — Sep 2022
Sofia, Bulgaria
- TDCX “Novel radioactivity measurement techniques based on fast timing, digitization, coincidence and cross-correlation measurements”**
- Task leader: Development of a device that measures time difference between scintillation events with 200 ps timing resolution
 - Task leader: Development of waveform digitization techniques and off-line data analysis for scintillation detectors
- Mar 2020 — Aug 2020
Sofia, Bulgaria
- PhD project: “Development of methods for the evaluation of accidental coincidences in TDCR measurements”**
- Sofia University Science Fund
- Jan — Jun 2018
Sofia, Bulgaria
- MetroRadon “Metrology for radon monitoring”**
- European Metrology Programme for Innovation and Research
- Development of ^{222}Rn activity measurement techniques using liquid scintillation counting

- Jan 2017 — Jan 2018 **Polyrad project “Research of properties of novel high-tech polymer materials for development of new radon measurement techniques”**
Sofia, Bulgaria
- Development and characterization of scintillation detectors
 - Characterization of diffusion properties of ^{222}Rn in polymers

Awards

- Astronomy and Astrophysics
- Bronze Medal, [International Olympiad on Astronomy and Astrophysics](#), Rio de Janeiro, Brazil, 2012
 - Silver Medal, [International Astronomy Olympiad](#), Trieste, Italy 2008
 - Participation Award, [International Astronomy Olympiad](#), Shanghai, China 2009
 - 3rd Place, National Olympiad on Astronomy, Bulgaria 2010
 - 1st Place in the National Contest “Space – present and future of mankind” for the creation of an online astronomy encyclopedia in Bulgarian. 2007
- Physics
- 1st place, National Physics Competition, Bulgaria 2012
 - Award in the name of G. Nadzhakov for achievements in the field of Physics from [Eureka Foundation](#), 2015
 - Award for exceptional achievements in the field of Physics and Astronomy from the National High School of Mathematics and Science “Akad. L. Chakalov” 2012
- Robotics
- 3rd Place, National Robotics Competition, Technical University Sofia, 2015
 - 1st Place, SoftUni Tech Fest – category Robotics, 2017
- Mathematics
- 1st Place, National Olympiad on Computer Mathematics, Bulgaria, 2015
 - Silver Medal, National Olympiad on Mathematics, 2015
 - Bronze Medal, National Olympiad on Mathematics 2016