Akmal Safarov (PhD)

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PROFESSIONAL EXPERIENCE

Samarkand State University – Samarkand, Uzbekistan. *January 2019 – Present*

Associate Professor

Duties: Teaching, project management, manpower development, lab improvement; dose rate measurements, sampling, spectra acquisition and processing, composing reports.

***Projects*:**

- NPP[1] project – radiation monitoring of NPP construction sites: mapping of gamma dose rates using bGeigie nano radiation sensor, measurement of natural radionuclide contents in soil, plants, water and bottom deposits samples, determination of radon flux density from the soil surface;
- IAEA[2] technical cooperation project UZB0006 (Education improvement, manpower development for NPP) – author of the concept, counterpart. Designed project, new courses, equipment list and national training events, brought direct investments in the amount of 278.7K €
- UniCEN project (funded by the US embassy) – author of the project. Budget: 40K$. Goal: co-develop and cross-pollinate effective, hands-on nuclear physics educational activities.
- MISTI project (funded by the Massachusetts Institute of Technology) – international collaborator. Budget 27K$. Title: Big Data Mapping and Correlation of Environmental Containments as Monitored by Biological and Human Isotopic Uptake.

Massachusetts Institute of Technology *March 2022 – August 2022*

Department of Nuclear Science and Engineering

Cambridge, MA, USA

Visiting scholar

Duties: Development of laboratory scripts for reactor physics course using the open-source code OpenMC and Python-based jupyter notebooks.

Samarkand State University – Samarkand, Uzbekistan. *January 2008 – Dec 2018*

Researcher/IAEA Counterpart

Duties: project management, strategic planning, collaboration with international experts and specialists, procurement of equipment and training people to improve educational process in the nuclear science; measurement of radionuclide concentrations in environmental objects, spectral and data analysis.

***Projects**:*

- IAEA Technical cooperation project UZB0005 (Education improvement) – project counterpart, improved lab's experimental basis by procuring new equipment and training people in foreign centers, budgeting & budget review, brought direct investments in the amount of 173K €
- IAEA Technical cooperation project UZB0004 (Education improvement) – created new labs for bachelors and masters in nuclear physics department, developed lab scripts, organized two national training courses, installed and adjusted research grade equipment together with experts, oversaw deployment of wired and wireless networks, brought direct investment in the amount of 230K €;
- European Commission's $1.5M project UZ4.01/10 (waste management) – with the team of European researchers performed sampling, measurements (dose rate, spectra) and analysis of data for environmental impact assessment.
- UzGTL (Uzbekneftegaz, Sasol and Petronas joint venture, expected to be 3rd biggest GTL[3] factory in the world) ~$4 Bln project ~ (oil and gas industry) – supervised a team that performed analysis of data collected with radiation sensors and detectors for environmental impact assessment of construction site using cutting-edge computer algorithms;
- Closed Nuclear Cities Program's 156K £ project (Food and construction industry), UK – developed a nationwide network of computers coupled with radiation measuring equipment; applied remote desktop protocols for monitoring purposes and encrypted channels for data exchange;

International Atomic Energy Agency –Vienna, Austria *June 2015 – June 2016*

Research fellow

Duties:

- In-situ measurement of primordial and technogenic radionuclides using PGIS-2 portable gamma-ray spectrometer;
- Analyzed scintillation spectra (NaI(Tl));
- Applied CERN's[4] ROOT programming framework to results of experiments conducted by lab team;
- Helped research team to install, adjust and run software to tablet type PCs to control equipment used in in-situ monitoring;

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University of Surrey –Guildford, UK *June 2013 – August 2013*

Research fellow

Duties:

- Performed energy and efficiency calibration of scintillation, LaBr3 and HPGe[5] detectors;
- Measured concentrations of NORMs[6] in environmental samples from Kuwait using HPGe detector;
- Assisted team members with the processing of obtained data using GENIE and Radware spectral analysis software packages;

Argonne National Laboratory DOE –Lemont, IL *August 2010 – Oct 2010*

Resident associate international trainee

Duties:

- Composed input files describing research reactor design and specifications;
- Adjusted nuclear research reactor computer codes to a specific task;
- Wrote code for WIMS software package to calculate cross sections of nuclear reactions;
- Used complicated computer simulation software (WIMS-ANL, REBUS-PC, PLTEM and PARET-ANL) to compose safety report for WWR-SM nuclear reactor.

EDUCATION

Institute of Nuclear Physics. Tashkent, Uzbekistan
(PhD) Doctor of Philosophy. May 18, 2021.

Samarkand State University. Samarkand, Uzbekistan
Master of Science, Major: Nuclear Physics.
Grad: June, 2009

Samarkand State University, Samarkand, Uzbekistan
Grad: June, 2007
Bachelor's degree with Honours, Physics.

SKILLS AND AWARDS

- Quad lingual (fluent in all four): English, Russian, Uzbek, and Tajik. Basic knowledge of German
- Alumnus of Future Leaders Exchange (FLEX) Program funded by the US Department of State
  - Was chosen as one of 55 scholarship winners from several thousand applicants from all schools of Uzbekistan; (2002-2003) Finished Lawrence North High School, Indianapolis, Indiana, USA.
- Certificate for active membership in Internet Access and Training Program funded by the International Research and Exchanges Board (IREX, USA). Organized first internet access to the public of Samarkand and provided training in the usage of web resources.
- Winner of [7]ICTP-IAEA Sandwich Training Educational Programme (PhD level).
- Author of over 12 conference papers and 10 articles in international peer reviewed journals;
- Attendant of a number of international workshops and meetings on nuclear science, environmental monitoring, radiation detecting techniques, data acquisition and processing, instrumentation design, use of IoT technologies, digital signal processing, data visualization, big data, 3D printing and machine learning.
- Proficient in: **OS** → Windows, Linux; **Microsoft Office** → MS Excel, MS Outlook, MS Word, MS Power Point, **Graphics** → Adobe Photoshop, Corel draw; **Computer Math**→Waterloo Maple and Wolfram Research Mathematica; **Web development**→ HTML, CSS, Wordpress; **Programming**→ C++, Delphi; **Reactor software**→REBUS-PC, PLTEMP, PARET; **Gamma-spectrometry software**→ Maestro-32, Genie-2000, ASW Radek, ORNL_Radware; **Data analysis**→ ROOT CERN, Microcal Origin; **Mapping**→ Google Earth Pro, QGIS.

References available upon request

ABBREVIATIONS

[1]NPP – Nuclear Power Plant; [2]IAEA – The International Atomic Energy Agency; [3]GTL – Gas-To-Liquid plant project in Uzbekistan; [4]CERN – The European Organization for Nuclear Research; [5]HPGe – high-purity germanium detector; [6]NORM – naturally occurring radioactive material; [7]ICTP – International Centre for Theoretical Physics;

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TEACHING

- Teaching **Atomic Physics, Nuclear Physics, Nuclear Energy** (2021-present)
- Teaching **Nuclear Electronics** and **Fundamentals of Nuclear Reactor physics** (2020-present)
- Taught **Atomic Physics** in English language, one semester in Samarkand State University, Uzbekistan (2014/2015)

WORKSHOPS AND MEETINGS

- (2025, Trieste, Italy) → Joint ICTP-IAEA Fusion energy school.
- (2025, Cambridge, USA) → Visiting scientist within the joint MIT-Samarkand State University project MISTI.
- (2023, Dushanbe, Tadjikistan) → Workshop on "Internationalization and capacity building" within the Central Asia University Partnership Program (UniCEN)
- (2021, Tashkent, Uzbekistan) → Conference on "Sharing knowledge and sustaining networks" within the Central Asia University Partnership Program (UniCEN)
- (2019, Trieste, Italy) → Joint ICTP-IAEA workshop on electrostatic accelerator technologies, basic instruments and analytical techniques;
- (2017, Trieste, Italy)→ ICTP-IAEA workshop on environmental mapping mobilizing trust in measurements and engaging scientific citizenry;
- (2016, Vienna, Austria)→ European Geosciences Union, General Assembly;
- (2015, Vienna, Austria)→ Technical meeting on the development of nuclear instrumentation for in-situ environmental monitoring programs;
- (2013, Trieste, Italy)→ Workshop on advances in digital spectroscopy;
- (2012, Vienna, Austria)→ Regional workshop on quality procedures and management practices towards improved environmental radioactivity monitoring;
- (2012, Richland, USA)→ International workshop on nuclear forensics methodologies (IAEA, PNNL DOE).

SELECTED PUBLICATIONS

1. **Sh.Khasanov, Youwu Su, A.A.Safarov, H.M.Tedila, O.Mamatkulov.** Major radioactive ion beam facilities: a brief global overview. European physical journal plus 140, 638 (2025).
2. **L.B. Fontana, J. Yu, M.P. Short, T. Durak, E. Lamere, M.S. Galanek, A.A. Safarov, H.M. Wainwright.** Design and modeling of Cf-252 -based neutron irradiator for NAA: MCNP6 simulations of dose rate and neutron fluxes. Applied Radiation and Isotopes, volume 225, 111990. (2025).
3. **A.Azimov, A.A.Safarov, A.N.Safarov, A.K.Mukhamedov, Sh.Kh.Khasanov, M.Salimov and M.Muminov.** GSProcessor: a software for batch processing of scintillation gamma-spectra. Journal of radioanalytical and nuclear chemistry (2025).
4. **Sh. Khasanov, Youwu Su, Renat Suleymanov Akmal Safarov and Askar Safarov.** A setup and analytical dose calculation model for solid-state sample irradiation using a microtron type e-beam accelerator. Radiation Detection Technology and Methods vol.8, pp.1568-1577, 2024.
5. **U.Tukhtaev, S.Khasanov, J. Fayzullayev , A.Safarov , B.Togaev, Seyedkarim Afsharipour** Determination of natural radionuclides and heavy metal concentrations in the groundwater and adjacent areas of the Kattakurgan reservoir, Uzbekistan. Radiochimica Acta, vol. 112, no. 2, pp. 127-137, 2024.
6. **A.A.Safarov, A.N.Safarov, Sh.Khasanov, E.Umirzakov, Ram Proshad, S.Suvanova, M.Muminov.** Evaluation of radon hazards at the rural settlements of Uzbekistan. *Environ Monit Assess* **195**, 915 (2023).
7. **U.Tukhtaev, Sh.Khasanov, A.Safarov and Proshad, Ram.** "Assessment of radioactivity of the Sobirsoy reservoir and adjacent areas of the Nurabad district, Uzbekistan" *Radiochimica Acta*, 2023.
8. **S. Khasanov, A.A. Safarov, A.N. Safarov, R. Suleymanov, K. Norboev and S. Khadka.** A setup for irradiation of biological samples based on accelerated electrons. Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms, vol. 525, (2022)**,** pp. 13–17.
9. **Sh.Khasanov, R.D. Suleymanov, A.A.Safarov., A.N. Safarov, H.M. Tedila & R. Muratov**. Calculation of exposure and absorbed dose at irradiation samples by electron bremsstrahlung. Radiation Physics and Chemistry, (2021), 188, 109651.
10. **Sh.Khasanov**, **N. Bazarbaev, A. Muminov, T. Muminov, K. Norboev, A.A. Safarov, A.N. Safarov, R.D. Suleymanov** Specular reflection of hard gamma-quanta from surfaces with different roughness. Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms. (2021), Sep 1;502:10-7.
11. **A.A.Safarov, A.N.Safarov, A.N.Azimov, I.G.Darby.** Rapid assessment methodology in NORM measurements from building materials of Uzbekistan. Journal of Environmental radioactivity. Vol. 169-170 (2017) 186-191.
12. **A.N.Azimov, A.A.Safarov, A.N.Safarov, A.Kh.Inoyatov, I.T.Muminov, D.Sh.Rashidova.** Radioactivity of natural waters of Nurabad district of Samarkand region, Uzbekistan. Atomnaya Energiya [Atomic Energy], (2015), Vol.118, No.3, p.175-177.
13. **A.N.Azimov, A.K.Mukhamedov, A.A.Safarov, A.N.Safarov.** Estimation of Pb-214 and Bi-214 concentrations in rain water. Atomnaya Energiya [Atomic energy] (2013), Vol.113, No.5, p.295-298
14. **S.Baytelesov, F.Kungurov, A.Safarov, U.Salikhbaev.** Using 6- and 8-tube IRT-4M fuel assemblies in WWR-SM research reactor core. Uzbek Journal of Physics, Vol. 12, (2010) p.422-428

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15. **Muminov T., Nasirov M., R.Scott Van Pelt, Safarov A., Halikulov A., Xushmurodov Sh.** *«Radionuclides in soils along a mountain-Basin transect in the Koratepa Mountains of Uzbekistan»* Journal of Soil and Water Conservation 2010 65(5); 117A-121A.
16. **A.N.Azimov**, **Sh.Kh.Hushmuradov, I.T.Muminov, T.M.Muminov, B.S.Osmanov, A.N.Safarov, A.A.Safarov.** Gamma-spectrometric determination of natural radionuclides and ^{137}Cs concentrations in environmental samples. The improved scintillation technique. Radiation Measurements, vol.43 (2008), p. 66-71
17. **A.Kh.Inoyatov, I.T.Muminov, A.K.Mukhamedov, D.Sh.Rashidova, B.S.osmanov, A.A.Safarov, A.N.Safarov, Sh.Kh.Khushmurodov.** Radionuclides in the environment of Nuratau. Journal of Radioanalytical and Nuclear Chemistry, vol.273, No.2 (2007) p. 497-506.
18. **A.N.Azimov, A.Kh.Inoyatov, I.T.Muminov, A.K.Muhamedov, I.V.Pleshenko, D.Sh.Rashidova, A.N.Safarov, A.A.Safarov, A.T.Khudayberdiyev.** The study of radionuclide composition of clay using scintillation gamma-spectrometry technique. Atomic Energy, (2007), Vol.102, No.3, p.192-194
19. **A.Ajabov, F.R.Kungurov, I.T.Muminov, A.K.Muhamedov, A.A.Safarov, A.N.Safarov** Monthly variations of cosmogenic ^{7}Be in atmospheric fallouts in Samarkand. Uzbek Journal of Physics. (2005), V7 (No.5-6), p. 404-406.
20. **I.T. Muminov, A.K. Muhamedov, B.S. Osmanov, A.A. Safarov, A.N. Safarov.** Application of NaI(Tl) detector to measurement of natural radionuclides and ^{137}Cs in environmental samples – new approach by decomposition of measured spectrum. Journal of environmental radioactivity. (2005), V.84(3), p.321-331.