

Project name, IRN	AP09258546 – Simulation the influence of fringe fields in the design and calculation of gridless energy and mass analyzers of charged particles
Completion date	01.02.2020-31.12.2023
Project supervisor	Spivak-Lavrov I.F, d.ph.-m.s., professor
Relevance of the project	The main idea of the project is related to the creation of field structures based on two-dimensional and axisymmetric electrostatic mirrors in which charged particles can be introduced into the analyzer and removed from the analyzer through holes in the electrodes. The holes are made in specially simulated fieldless areas, which allows the necessary optimal field configuration to be made without the use of fine-grained meshes.
Purpose	The aim of this project is to develop analytical and computer methods that take into account the influence of edge fields and carry out modeling of the necessary field structures for calculating and optimizing the instrument characteristics of gridless energy and mass analyzers based on two-dimensional and axisymmetric electrostatic systems.
Expected results	<ul style="list-style-type: none"> • Development of mathematical methods for calculating the field of meshless mirrors based on two-dimensional and axisymmetric electrostatic fields, in which there are sufficiently extended fieldless sections to make holes for entering charged particles into the analyzer and their output from the analyzer. • Construction of an adequate mathematical and computer model for calculating CBS edge fields and their influence on the behavior of bulk beams of charged particles in two-dimensional and axisymmetric fields. • Development based on the Monte Carlo method of algorithms and a software package for calculating the instrument characteristics of gridless energy and mass analyzers based on two-dimensional and axisymmetric electrostatic systems. • Numerical calculations and optimization of the developed schemes of gridless energy and mass analyzers based on two-dimensional and axisymmetric systems.
Research group	<p>Supervisor – Main researcher: Spivak-Lavrov I.F, d.ph.-m.s., professor, H index=4 (Author ID в Scopus – 6603647700; Researcher ID - AAQ-8729-2020, ORCID - 0000-0002-2683-2425).</p> <p>https://www.scopus.com/authid/detail.uri?authorId=6603647700</p> <p>Doskeyev Gimalin, c.ph.-m.s., associate professor, H index=3 (Author ID в Scopus – 41561232800; ORCID - 0000-0002-0772-4517).</p> <p>https://www.scopus.com/authid/detail.uri?authorId=41561232800</p> <p>Baisanov Orda, c.ph.-m.s., associate professor, H index=3 (Author ID в Scopus – 36134289000; ORCID -0000-0003-3326-7206).</p> <p>https://www.scopus.com/authid/detail.uri?authorId=36134289000</p>

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<p>Publications in scientific publications</p>	<ol style="list-style-type: none"> 1. Spivak-Lavrov I.F., Baysanov O.A., Sharipov S.U., Urinbaeva G.T. Dynamics of the flow of charged particles from a point source in a transaxial mirror // Bulletin of ARU No. 3 (65), 2021, Aktobe, - pp. 3-14. 2. Spivak-Lavrov I.F., Shugaeva T.Zh., Sharipov S.U. Calculation of a time-of-flight mass spectrometer based on axisymmetric cylindrical mirrors // Bulletin of ARU No. 3 (65), 2021, Aktobe, - pp. 15-26. 3. Spivak-Lavrov I.F., Baysanov O.A., Shugaeva T.Zh. Prismatic mass analyzer with conical achromatic prism and transaxial lenses // Abstracts 13th International Conference "Nuclear and Radiation Physics", 2nd International Conference "Nuclear and Radiation Technologies in Medicine, Industry and Agriculture". – 2021, Almaty, - P. 221. 4. Spivak-Lavrov I.F., Baysanov O.A., Sharipov S.U., Urinbaeva G.T. Calculation of a time-of-flight mass analyzer based on transaxial mirrors // Abstracts 13th International Conference "Nuclear and Radiation Physics" 2nd International Conference "Nuclear and Radiation Technologies in Medicine, Industry and Agriculture". – 2021, Almaty, - P. 229. 5. Spivak-Lavrov I.F., Baysanov O.A., Sharipov S.U., Urinbaeva G.T. Dynamics of charged particle beams in a transaxial mirror // Tenth congress of the VMSO IX All-Russian conference with international participation "Mass spectrometry and its applied problems". - October 18-22, 2021, Moscow. - p. 89.