

<b>Project name, IRN</b>	<b>AP22685992 – Development of energy and mass analyzers for space research.</b>
<b>Completion date</b>	01.01.2024-31.12.2026
<b>Project supervisor</b>	Shugayeva Tilektes, PhD, senior lecturer
<b>Report</b>	<p>The main idea of the project is related to the invention of mass spectrometers and energy analyzers, which can be used in physics in the study of fast processes, in bioorganic chemistry for the identification and quantitative analysis of various substances, as well as in space research and other fields under conditions of severe restrictions on mass and dimensions devices.</p> <p>Time-of-flight mass spectrometers are widely used in space research due to their small size and weight, since these parameters are important in space conditions. Time-of-flight mass spectrometers are used to determine the chemical composition of cosmic dust and the spacecraft's own atmosphere. The advantages of such mass spectrometers compared to instruments of other operating principles are their small size and high sensitivity.</p>
<b>Relevance</b>	<p>Comparing the advantages and disadvantages of different mass analysis methods used in portable instruments, we can conclude that static magnetic analyzers require less complex electronic equipment and less power consumption than dynamic analysis systems, while the latter have a simpler design and are easier to miniaturize.</p> <p>At the same time, rapid determination of the composition of multicomponent mixtures in real time can only be achieved by static magnetic or dynamic time-of-flight mass analyzers, which distinguishes them favorably from all other methods of analysis. Moreover, time-of-flight systems have the advantage of being able to practically unlimitedly increase the mass range and completely suppress detector noise, while static systems allow the use of relatively high sample pressure in the ionization region and have greater freedom in design choice, which is important when working with low-volatile substances.</p>
<b>Purpose</b>	Development, calculation and computer modeling of a gridless energy analyzer based on two-dimensional axisymmetric electrostatic mirrors, as well as mass analyzers for space research.
<b>Expected results</b>	<p>1) based on the results of research conducted within the framework of the project, the following publications are planned:</p> <ul style="list-style-type: none"> <li>- at least 2 (two) articles in journals from the first three quartiles by impact factor in the Web of Science database or having a CiteScore percentile in the Scopus database of at least 50.</li> </ul> <p>2) the development of scientific, technical and design documentation is not planned;</p> <p>3) dissemination of the results of the work among potential users, the scientific community and the general public will be carried out in the form of publications in scientific journals, as well as through participation in international scientific conferences;</p> <p>4) The target consumers of the results obtained can be scientific laboratories and higher education institutions.</p> <p>5) The fundamental results obtained can be used to create new promising COS.</p>
<b>Research group</b>	Supervisor – Main researcher: Shugayeva Tilektes, PhD, Senior lecturer, H index = 1 ((Scopus Author ID: 57210147416; Researcher ID: <a href="https://orcid.org/0000-0002-4797-4529">AAQ-5091-2020</a> ; ORCID: 0000-0002-4797-4529). <a href="https://www.scopus.com/authid/detail.uri?authorId=57210147416">https://www.scopus.com/authid/detail.uri?authorId=57210147416</a>

<p><b>List of published works</b></p>	<p>Spivak-Lavrov Igor Felixovich, D.Sc. (Phys.Med.), professor, Indeh Hirsha – 5</p> <p>ResearcherID – 3708676  Researcher ID Web of Science – AAQ-8729-2020  ORCID – 0000-0002-2683-2425  Scopus Author ID – 6603647700S copus Author ID –36134289000</p> <p>1. I.F. Spivak-Lavrov, A.Sh. Amantaeva, O.A. Baisanov., Shugaeva T.Zh. Approximate calculation of static mass analyzers based on two-dimensional fields, Vestnik KazNu. Almaty - 2024. - Volume 90. No. 3, p. 77–83. DOI:<a href="https://doi.org/10.26577/RCPH.2024v90i3-010">https://doi.org/10.26577/RCPH.2024v90i3-010</a></p>
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<b>Publications in scientific publications</b>	И.Ф. Spivak-Lavrov, A.Sh. Amantaeva, O.A. Baisanov., Shugaeva T.Zh. Approximate calculation of static mass analyzers based on two-dimensional fields, Vestnik KazNu. Almaty – 2024. – Volume 90. No. 3, p. 77–83. DOI: <a href="https://doi.org/10.26577/RCPh.2024v90i3-010">https://doi.org/10.26577/RCPh.2024v90i3-010</a>