Brief information about the project

Name of the project	AP09260349 «Dynamic properties of Coulomb systems in 2D and 3D geometry»
Relevance	In this project, we study the dynamic properties of two-dimensional and one-dimensional Dirac plasma. Further studies of massless Dirac plasmas, including electron-positron and quark-gluon systems and electrons in graphene, are planned. Thus, the proposed study of dynamic processes is new and its results, based on the application of modern mathematical methods of analysis, particularly the method of moments, which allows us to study non-perturbative systems, in the absence of small parameters, can be published in rating scientific journals.
Purpose	The goal of the proposed project is to study the dielectric properties of single-component Dirac plasma in various geometries, and the stopping power of a flat layer of plasma. The dynamic characteristics of plasma will be analyzed numerically and graphically in a wide range of changes in the parameters of systems of charged particles
Objectives	To achieve the project goal, the following tasks are required. 1) Wave dispersion in three-dimensional Dirac plasma. 2) Dynamic characteristics of two-dimensional Dirac plasma 3) Stopping power of two-dimensional plasma.
Expected and achieved results	The dispersion of waves in a three-dimensional Dirac plasma is calculated. The stopping power and dynamic characteristics of two-dimensional plasma are calculated.
Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles	The scientific director of the project is Yuri V. Arkhipov, Doctor of Physical and Mathematical Sciences, Professor, Hirsch index - 12, citation index - 462. Author ID Scopus – 6603726292, and Researcher IDWebofScience – N-4833-2014 (Google Scholar: https://scholar.google.com/citations?hl=ru&user=PcTy3pYAAAAJ&view_op=list_works&sortby=pubdate , Scopus: https://www.scopus.com/authid/detail.uri?authorId=6603726292). **Igor M. Tkachenko**, Doctor of Physical and Mathematical Sciences, and Professor, the Head of the Mathematical Physics Group at the Department of Applied Mathematics of the Polytechnic University of Valencia, Spain. His **H-index is 18, and the total number of citations is 1087**. AuthorID Scopus – 7006413551, ResearcherID Web of Science – A-4125-2015.

	Askar E. Davletov is an Academician of the National Academy of Sciences of the Republic of Kazakhstan (NAN RK), a Doctor of Physical and Mathematical Sciences, and Professor. His **H-index is 13, and the total number of citations is 381**. AuthorID Scopus – 6602642543, ResearcherID Web of Science – O-1078-2014. **Abdiadil Askaruly**, a PhD in Physics from al-Farabi Kazakh National University and in Mathematics from Polytechnic University of Valencia in Spain, an Associate Professor. His **H-index is 6, with a total of 186 citations.** AuthorID Scopus – 19933346500, ResearcherID Web of Science – O-2140-2014. **Asel B. Ashikbayev**a. She holds a PhD in Physics and an Associate Professor. Her **H-index is 5, with a total of 80 citations**. AuthorID Scopus – 55701550400, ResearcherID Web of Science – O-2144-2014. **Saule A. Syzganbayeva**, a PhD in physics. Her **H-index is 3, and the total number of citations is 25**. Author ID Scopus – 57204595369, Researcher ID Web of Science – DYQ-2050-2022. **Lyazzat T. Yerimbetova**, a PhD in physics. Her **H-index is 3, and the total number of citations is 30**. AuthorID Scopus – 55702201200, ResearcherID Web of Science – O-2204-2014.
List of publications with links to them	*1 J. Ara, Ll. Coloma, I.M. Tkachenko Static and dynamic properties of classical and quantum one-component plasmas // 17th International Conference on the Physics of Non-Ideal Plasmas. - Germany, 2021. - P. 26.* *2 Yu.V. Arkhipov, A.B. Ashikbayeva, A. Askaruly, A.E. Davletov, I.M. Tkachenko Optical properties of binary ionic mixtures // 17th International Conference on the Physics of Non-Ideal Plasmas. - Germany, 2021. - P. 61.* *3 J. Ara, Ll. Coloma and I. M. Tkachenko Static properties of a warm dense uniform electron gas Physics of Plasmas 28, 112704 (2021); doi: 10.1063/5.0062259. Scopus: (Процентиль 61%), Web of Scince: Q3.* ***4 Syzganbayeva S., Ara J., Askaruly A., Ashikbayeva A. Tkachenko I. Arkhipov Y. Collective phenomena in a quasi-classical electron fluid within the interpolational self-consistent method of moments // EPL, 140 (2022) 11001, doi: 10.1209/0295-5075/ac9156. Scopus: (Процентиль 59%), Web of Scince: Q3.*** ***5 Yu.V. Arkhipov, A.B. Ashikbayeva, A. Askaruly, A.E. Davletov, A.B. Yerkin Исследование динамического структурного фактора бинарных ионных смесей // Том 81 № 2 (2022): Вестник. Серия физическая, doi.org/10.26577/RCPh.2022.v81.i2.04. (КОКСОН)***

	6 I.M. Tkachenko, V.M. Rylyuk Theory of energy loss of charged projectiles in magnetized one-component plasmas // International Journal of Mathematics and Physics, doi.org/10.26577/ijmph.2023.v14.i1.09 ***7I.M. Tkachenko, V.M. Rylyuk Electromagnetism of One-ComponentPlasmas of Massless Fermions // Journal of Plasma Physics (2023), vol. 89, 905890415, doi:10.1017/S0022377823000752. Scopus: (Процентиль 37%), Web of Scince: Q2*** ***8 A. Askaruly, A.B. Ashikbayeva, A.E. Davletov, S.A. Syzganbayeva, Yu.V. Arkhipov, I.M. Tkachenko Virtual rotons and ghost plasmons in proton-deuteron mixtures // Journal of Physics A: Mathematical and Theoretical (подано) Scopus: (Процентиль 80%), Web of Scince: Q1*** ***9 D. Ballester, Yu.V. Arkhipov, I.M. Tkachenko Response to 'Heisenberg-limited sensitivitybwith decoherence-enhanced measurements // NATURE COMMUNICATIONS (на стадии рецензирования) Scopus: (Процентиль 96%), Web of Scince: Q1***
Patents	-