Brief information about the project

Name of the project	AP14869140 ``The study of QCD effects in non-QCD theories''
Relevance	The relevance of the planned research is that QCD effects will be studied in non-QCD theories.
Purpose	The goal of the project is to study regular solutions of field equations in non-QCD theories describing configurations with finite energy and dimensions, as well as non-zero Poynting vector and angular momentum. Establishing a connection between non-QCD solutions and QCD solutions and explaining this correspondence
Objectives	**1**. Obtaining axially symmetric solutions in Proca theories with a longitudinal electric field. Comparison of the obtained solutions with solutions describing flow tubes, which are obtained as a result of lattice calculations in QCD. 2. Obtaining solutions in Proca theories with finite values of energy density and Poynting vector. The presence of a non-zero Poynting vector in an axially symmetric solution will indicate the presence of momentum along the symmetry axis. The properties of such tubes will be compared with the properties of similar tubes between quarks in QCD, which may contribute to the proton spin. 3. Obtaining and studying the properties of monofield-like solutions in the SU(2) Yang-Mills theory, where the source is a spinor field described by the nonlinear Dirac equation. The energy spectrum of these solutions has a mass gap, the properties of which will be further studied. An important direction of research will be the search for possible connections between the obtained mass gap for monofield-like solutions and the mass gap in QCD. 4. One of the main tasks of this project will be to identify possible connections between the above objects obtained in non-QCD theories with the corresponding configurations in quantum chromodynamics.
Expected and achieved results	New directions in theoretical physics will be explored regarding the possible connection between certain field theories on the one hand and quantum chromodynamics on the other hand.
Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles	1. Джунушалиев Владимир Джумакадырович, доктор физико-математических наук, профессор, индекс Хирша – 17. ORCID: https://orcid.org/0000-0001-9479-5606). ResearcherID: N-7008-2014; Scopus Author ID: 55887756300 2. Фоломеев Владимир Николаевич, доктор физико-математических наук, профессор, главный научный сотрудник, индекс Хирша – 15. ORCID: https://orcid.org/0000-0003-4160-5850). 3. Жолдахмет Дина Кенжеханқызы.

List of publications with links to them	1. Vladimir Dzhunushaliev, Vladimir Folomeev, Dina Zholdakhmet, “Spinor domain wall and test fermions on an arbitrary domain wall”, Eur. Phys. J. C (2023) 83:550. 2. Vladimir Dzhunushaliev, Vladimir Folomeev, Daulet Berkimbayev, “Charge gap in SU(3) Yang–Mills-plus-nonlinear-spinor-field theory”, Eur. Phys. J. C (2023) 83:546. 3. Vladimir Dzhunushaliev, Vladimir Folomeev, Burkhard Kleihaus, Jutta Kunz, “Mixed neutron-star-plus-wormhole systems: Rotating configurations”,Physical Review D 107, 044060 (2023).
Patents	-