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Ministry of Science and
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**NATIONAL UNIVERSITY OF
SCIENCE AND TECHNOLOGY
"MISIS"**

4, Leninskiy prospect, 119049, Moscow, Russia
Tel: +7(495) 638-46-29; +7(495) 955-00-32
http://www.misis.ru
Email: kancela@misis.ru

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Frank Laboratory of Neutron Physics
Joint Institute for Nuclear Research

6 Joliot-Curie St.
Dubna Moscow Region
Russia 141980

PROJECT REVIEW
"MODERNIZATION OF **EG-5** ACCELERATOR
AND ITS EXPERIMENTAL INFRASTRUCTURE"
(project leader – Doroshkevich A.S.)

Electrostatic generator EG-5, based on Van de Graaf generator, stationary operates in Frank Laboratory of Neutron Physics JINR since 1965 year. Due to the relative simplicity and reliability of the design and the unique combination of ion beam parameters (high spatial and energy stability with a relatively large current), the EG-5 accelerator currently remains the most effective and convenient nuclear physical tool for solving a wide range of current scientific problems of core physics, condensed physics, biology, electronics, medicine.

A relatively high ion beam current (up to 0,1 mA) allows to obtain in the reaction (D(d,n)3He) fast monochromatic neutrons with an energy of up to 20 MeV. According to the Nuclear data high priority request list [1], this range of energies is highly sought after in modern nuclear physics research. The high spatial stability (~ 0.01%) of the ion beam, that is typical to single-stage EG-5 type accelerators, makes it possible to conduct studies with very high accuracy of the elemental composition of the surface layers of materials and makes it possible to create a unique micro-beam spectrometer with an ion beam size of less than 1 μm based on EG-5.

Thus, the decision of the project authors to create a neutron generator and a nuclear microprobe based on the EG-5 accelerator is correct. It is known that both options are currently unique both for the Russian Federation and for the JINR member states [2, 3]. A wide range of FLNP scientific problems expected to be solved using the accelerator, the uniqueness of these options emphasizes the relevance of the project. The resource potential of both the human resources of the group and the material resources of FLNP and JINR guarantees the possibility of practical implementation of the project.

It should be noted a good development and detail of the algorithm for performing the tasks set out in the project, the essence of which is restoring of the technical parameters of the accelerator to the level of parameters at the time of its commissioning and reorganization of the group as a whole. To implement the main point of the project - to replace the high-voltage accelerating tube that has lost its operating parameters, it is planned to attract the world's leading manufacturer of relevant equipment (High Voltage Engineering Europa B.V.).

HVEE ion accelerators have been successfully operated at various domestic enterprises, scientific organizations and universities (NUST MISIS, MSU SINP, LPI RAS, SPE "Pulsar", SSC RF-IPPE, etc.) since the mid-70s. accelerating tubes at energies from hundreds of keV to 6 MeV have shown their best side. In the laboratory of ion implantation of NUST MISIS at the Department of Semiconductor Electronics and Semiconductor Physics, for almost 40 years of operation of HVE-380, there have been no failures in the operation of the accelerating tube.

The planned construction of a new laboratory for obtaining samples, complete with complementary methods for studying the physical properties of the surface of objects, will significantly increase the scientific potential of the group and the output of scientific products of the group and the Laboratory.

The modernization of the accelerator will expand the range of studies of the properties of the latest wide-gap semiconductor and dielectric materials, which are the basis of electronics and photonics of the future (gallium oxide, perovskites, gallium-gadolinium-aluminum garnets, etc.), which are actively studied at the Department of Semiconductor Electronics and Semiconductor Physics, NUST MISIS.

On the basis of the above reasons, I consider it expedient to implement this project at JINR. Taking into account the detailed elaboration of the project implementation algorithm and the fact of using production of the world's leading manufacturer of accelerating equipment. The project has a high potential of implementation.

References:

1. Nuclear Data High Priority Request List: https://www.oecd-nea.org/dbdata/hprl/search.pl?vhp=on;
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Ass. Prof., Dr.Tech.Sc.
Dep. of Semiconductor Electronics &
Semiconductor Physics
NUST MISiS

Lagov Petr Borisovich

119049, Moscow, Leninskiy prospekt 4
+7 499 237-21-29
lagov2000@mail.ru lagov.pb@misis.ru