

LXXII International conference "Nucleus-2022: Fundamental problems and applications"

Contribution ID: 476

Type: **Oral talk (15 min + 5 min questions)**

ACCELERATOR BASED NEUTRON SOURCE VITA

Wednesday, 13 July 2022 18:10 (20 minutes)

A compact accelerator-based neutron source VITA has been proposed and created at the Budker Institute of Nuclear Physics in Novosibirsk, Russia. The source comprises an original design tandem accelerator, solid lithium target, and a neutron beam shaping assembly. At present, the facility provides the production of protons or deuterons, the formation of neutron fluxes of almost any energy range: cold, thermal, epithermal, over-epithermal, monoenergetic or fast, as well as the generation of 478 keV, 511 keV or 9.17 MeV photons, α -particles and positrons.

Developed facility became a prototype of neutron sources for the boron neutron capture therapy clinics. The first commercial neutron source is installed at the Xiamen Humanity Hospital in China. The next two neutron sources are made for National Oncological Hadron Therapy Center in Pavia (Italy) and for National Medical Research Center of Oncology in Moscow (Russia).

The facility is used for the development of the boron neutron capture therapy technique, namely: i) to study the effect of neutron radiation on cell cultures and laboratory animals, ii) to treat large pets with spontaneous tumors, iii) to develop dosimetry tools, iv) to test new boron delivery drugs.

The facility is used for a number of other applications, namely: i) for measuring the cross section and the yield of nuclear reactions, ii) for studying radiation blistering of metals under ion implantation, iii) for radiation testing of advanced materials for ITER and CERN, iv) for measuring the thickness of the lithium layer, v) for studying the composition of films by back-scattered protons, vi) for in-depth investigation of the $^{11}\text{B}(p,\alpha)^{10}\text{B}$ neutronless fusion reaction, etc.

The report will describe the neutron source VITA, present and discuss the results obtained, and declare plans. This research was supported by Russian Science Foundation, grant No. 19-72-30005.

The speaker is a student or young scientist

No

Section

1. Synchrotron and neutron radiation sources and their use in scientific and applied fields

Primary author: TASKAEV, Sergey (Budker Institute of Nuclear Physics)

Presenter: TASKAEV, Sergey (Budker Institute of Nuclear Physics)

Session Classification: Synchrotron and neutron radiation sources and their use in scientific and applied fields