

## A LINEAR ELECTRON ACCELERATOR – TOP-UP INJECTOR FOR THE 4TH GENERATION SPECIALIZED SYNCHROTRON RADIATION SOURCE USSR

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The 4th generation synchrotron light source called Ultimate Source of Synchrotron Radiation (USSR-4) is under development at the moment in Russia [1]. Parameters of X-ray radiation of advanced modern Synchrotron Radiation Sources – brightness, coherence and temporal resolution – make it possible to provide experiments to study the structure of the widest range of objects in a variety of disciplines at a qualitatively new level compared to previous generation's sources. New 4th generation source design will be the one of the largest world scientific centers and will require the innovations and evolution in the domestic technologies of magnetic and vacuum systems, the solution of new problems in materials science and instrument engineering.

General facility layout includes 6 GeV main storage ring and a linac for top-up injection. Thus, it is proposed to use the same linac with two RF-guns. First of them will RF photogun and can be used to generate the drive beam for FEL. The second one will RF-gun with thermionic cathode can be used for injection into storage ring. Both injectors will operate with the same regular part of the linac which consists of 110 identical regular sections (see Fig. 1). The planning to have the transverse emittance of 70 pm-rad for the storage ring and less than 1 nm-rad for a FEL.

Fig. 1. Layout scheme of the 6 GeV top-up injection linac.

Development of a general layout of the top-up linac with the aim to minimize of the beam energy spread and transverse emittance at the exit, optimization of geometrical and electro-dynamical parameters of accelerating structures and analysis of the front-to-end beam dynamics in this linear accelerator will discuss in the report. All results of the beam dynamics simulation carried out using the BEAMDULAC package developed at the Department of Electrophysical Facilities of NRNU MEPhI [2].

1. V.S. Duybkov et al, Proc. of RuPAC'2021, TUPSB26 (2018), pp. 280-282.
2. E. Masunov, S. Polozov, Nucl. Instrum. Meth. A 558, (2006)

### The speaker is a student or young scientist

Yes

### Section

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

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