

ABOUT THE EFFICIENCY OF THE ELECTRON BEAM ION SOURCES AND TRAPS (EBIS/T)

A. Ramzdorf¹, V. Ovsyannikov¹, A. Levin²

¹*Joint Institute for Nuclear Research;* ²*Ioffe Physical-Technical Institute of the Russian Academy of Sciences*

E-mail: ramzdorf@jinr.ru

The ion source of the electron beam type (ESIS, which is the EBIS in certain condition of the reflex mode of operation) will be used at NICA acceleration complex. Thus the research of the EBIS theoretical efficiency is important and relevant. The talk presents the results of analysis and numerical computer simulation of the efficiency of an ion trap for the production of highly charged ions formed by the space charge of an electron beam, depending on its parameters and ionization conditions. The efficiency is defined as the product of the degree of compensation of the ion trap by ions and the relative number of ions with the required charge in the full charge spectrum. According to the numerical simulation the maximum number of ions with the required charge is possible only at a strictly specified pressure of the cooling substance, which is called optimal and depends on the electron current density and the composition of the cooling substance. At optimal coolant pressure, the efficiency is almost independent of the current density in the ion trap, but strongly depends on the charge state of the ions. A significant drop in the efficiency of the ion trap is shown with an increase in the ion charge.