

High repetition rate short pulse neutron source based on hundred milliamperere continuous wave accelerator

Neutron technology and related neutron detection technology have become a very important technical means in the research of basic disciplines such as science, life science and astrophysics. They are widely used in many important fields, such as industry, agriculture and medicine. Since there are no free neutrons in nature, in order to explore the world effectively with neutrons, it is necessary to develop a neutron-generating device. In order to solve the problem of accurate calibration of the energy spectrum response of the neutron measurement system, the high repetition rate short pulse neutron source based on 100 mA proton accelerator will be built, which has the characteristics of high number of single pulse neutron, narrow pulse width, high repetition rate and wide energy range covering 0.1 ~ 20 MeV range. The time-of-flight method can be used to calibrate the neutron response sensitivity of the whole energy range in one experiment, so the neutron calibration efficiency can be greatly improved. This report will introduce the technical route of the neutron source, the calculation results of the key equipment, the configuration of the device and the application prospect. The main technical indexes of the neutron source include: the maximum proton energy is 30 MeV, the number of particles in the micro-pulse beam is more than 1×10^{10} / pulse, the length of the micro-pulse beam is 1ns, the repetition frequency is 40 kHz, and the neutron yield is more than 1×10^{13} n/s. The technical parameter of the neutron source is very characteristic and has reached the international advanced level. It will provide a useful reference for us to develop an advanced neutron source based on a new technology.

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