

Discussion on Application of High Repetitive Frequency Intense Pulsed Neutron Sources

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Abstract

In order to establish experimental conditions of high strength neutron beam which can provide multiple energy points, a high repetitive frequency short pulse neutron source based on a high current proton accelerator will be built in the Northwest Institute of Nuclear Technology. The neutron source's main technical feature include: the maximum proton energy is 30 MeV, the number of micropulse cluster particles is more than 1×10^{10} /pulse, the length of micropulse cluster is 1 ns, 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. The time-of-flight method can be used to calibrate the sensitivity of all-energy interval neutron response, which can greatly improve the level of neutron measurement technology of our country. At the same time, based on its high-quality, high-strength neutron beam and proton beam, the frontier basic research will be carried out in other applied basic areas such as fast neutron physics, neutron or proton photography, nuclear hardening technique, Radiation effect. The neutron source will play an irreplaceable role in the construction of the subject of pulsed-ray physics and the training of the new generation of nuclear measurement technology through these application studies.

Keywords: High repetition frequency, ultrashort pulse, high-current proton accelerator, neutron source, application study