

Experimental Measurement of Neutronic Performance at Neutron Beam Line in CSNS

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China Spallation Neutron Source (CSNS) passed its national acceptance on August 23, 2018, and was officially open to worldwide users in various disciplines. Three neutron beam lines of target station, BL06, BL09 and BL20, have been constructed in the spectrometers room at CSNS. A primary mission of three beamlines is to study the neutronic performance of CSNS. This paper describes detailed objectives and experimental techniques to be adopted in the experiments.



Fig.1 Three neutron beam lines of target station, BL06, BL09 and BL20.

The neutronic performance measurements are crucial for commissioning and operation to demonstrate that target stations are working properly to produce neutrons at a satisfactory level, it's also helpful to validate the MC simulation. The Current mode Time of Flight (CTOF) is chosen to measure the neutron spectrum during commissioning, this can be helpful to reduce the activity of target station components during commissioning due to the high detection efficiency. The experimental measurements agree well with the simulation results.

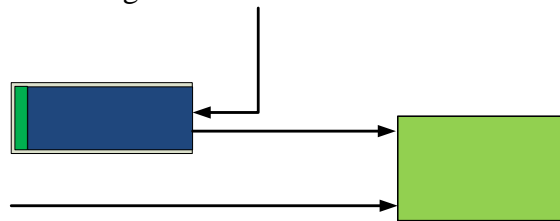


Fig.2 The electronic circuit diagram of CTOF technique.

The pulse shape of neutrons emitted from the moderator as a function of energy is essential for the design of instruments. A crystal monochromator and detector arrangement as shown in figure 3 is chosen to measure the pulse shape of scattered neutrons which energy fulfills the Bragg law. The neutron pulse shape experimental measurements of BL06 and BL09 agree well with the simulation results.

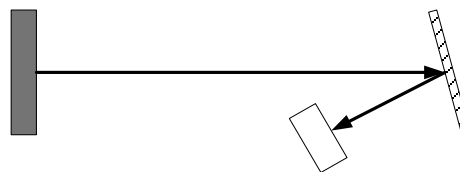


Fig.3 The schematic view of experimental arrangement for pulse shape measurement.