

Back-n White Neutron Facility as a Multi-purpose Research Platform

The Back-n white neutron source at CSNS (China Spallation Neutron Source) has been in operation since 2018, and provides a beam time of about 5000 hours per year. As a multidisciplinary research platform, Back-n has its main focus on nuclear data measurements but also covers the applications in neutron irradiation effects, detector calibrations, and elemental analysis and imaging using neutron resonances. With its unique beam-line using the back-streaming neutrons from a proton beam of higher than 100 kW in beam power impinging on a thick spallation target in tungsten, Back-n owns the highest neutron flux for a given flight path among white neutron sources. The other excellent properties include a wide neutron energy spectrum covering from 0.4 eV to 300 MeV and a good time resolution of a few per mille in most of the energy range. Currently available detector systems or spectrometers for nuclear data measurements are FIXM for fission cross-section measurements, C6D6 detectors and GTAF-II for neutron capture measurements, LPDA for light-particle emission measurements, NTOX for total cross-section measurements, and user-owned HPGe detectors for in-beam gamma spectrum measurements. Back-n has been providing beam times for irradiation effect studies, especially chip tests of the single-event-effects. It is also the unique facility in China to provide wide-energy range neutrons for detector calibration. A number of different methods to exploit neutron resonances for elemental analysis and imaging are also under development. In addition, Back-n is in the international collaboration on the experimental study on the time reversal violation with neutrons. This presentation will cover the above topics.

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