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We CANS Do It: A Step Towards a Canadian PC-CANS

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With a globally shrinking supply of neutron and the NIMBY perception that research reactors face, compact accelerator-driven neutron sources (CANS) are on the rise. CANS have potential to produce an intense source of pulsed neutrons, with a capital cost significantly lower than spallation sources and reactor sources along with much less public stigma. A prototype Canadian CANS (PC-CANS) is proposed as a step in rebuilding Canadian neutron capabilities. The PC-CANS is an installation proposed by the University of Windsor in collaborations with TRIUMF. The PC-CANS is envisaged to serve two neutron science instruments (small angle neutron scattering and neutron imaging), a boron neutron capture therapy (BNCT) station and a beamline for fluorine-18 radioisotope productions for positive emission tomography (PET). A computation study has found that there are no technical barriers to our PC-CANS design, and its small-angle neutron scattering (SANS) instrument will be attractive to users. Recent feedback from a submitted grant to fund construction of the PC-CANS facility, questions whether the proposed instrument would give significant data with its projected performance. This led to the use of the LOQ instrument at ISIS Neutron and Muon Source to capture data of a plethora of benchmark samples. Through aperture modifications, native and throttled settings were used to emulate and compare data quality from a proposed PC-CANS setup, employing a flux of about 1/6th the standard flux of LOQ. Data of a variety of disciplines, ranging from protein and lipid biochemistry to polymer chemistry, as well as common instrument standards were measured to compare data quality. Samples measured were able to give usable quality data, enhancing the case behind the utility of such an instrument. This work builds a case towards the feasibility and functionality of the proposed PC-CANS.

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