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Instrumentation at a compact accelerator-based neutron source

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Compact accelerator-based neutron sources (CANS) produce neutrons by low energy nuclear reactions well below the spallation threshold making them a cost-efficient and effective alternative to spallation and reactor based neutron sources. Such low energy (p, n)-reactions produce less and lower energy byproducts thus reducing significantly the radiation level. This allows the construction of a very compact target / moderator / reflector (TMR) unit with a thermal and cryogenic moderator placed close to the target providing a high phase space density or in other words a high brilliance neutron source. The compact design and the low radiation level allow the placement of optical elements close to the moderator surface, e.g. neutron guides or choppers, thus allowing the extraction of large phase space volumes with a large brilliance transfer to the sample. The instrumentation at a high power CANS with a proton beam power in the range of 100 kW, which we investigate in the framework of the HBS project, can be competitive to instruments at spallation sources with comparable beam power and current operated research reactors.

At the DN2020, I will present the potential a high power CANS offers for the design of different instruments e.g. reflectometer, SANS or spectrometers.

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