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The production and moderation of neutrons for a High Brilliance Neutron Source

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Compact accelerator based neutron sources (CANS) offer the possibility to establish a network of neutrons sources to cover various activities in neutron research throughout Europe.

Recent developments show that these sources are scalable, highly flexible, efficient and can be built and operated with reasonable costs as described in the High Brilliance neutron Source project (HBS) [1]. At such a source, neutrons are produced by protons or deuterons in the low MeV range impinging on a suitable target material. An optimized thermal and cryogenic moderator surrounding the target, moderates the neutrons to energies required by the instruments.

This target / moderator assembly is a crucial part of a CANS defining the performance but also raising engineering challenges. The target has to withstand an average power of 100 kW and a cryogenic finger moderator needs to be operated in a narrow extraction channel. Additionally to these challenges the whole assembly has to be optimized to the needs of the instruments ranging from thermal neutrons with a short neutron pulse to long wavelength instruments with a long neutron pulse.

We will present different target / moderator concepts for various instrument requirements built at a compact accelerator based neutron source.

[1] U. Rucker, et al.; The Jülich high-brilliance neutron source project; The European Physical Journal Plus 131, 19 (2016)

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