



Towards the Development of a Compact Very Cold Neutron Source for the Small-Angle Scattering Instrument for the High Brilliance Neutron Source

Dienstag, 17. September 2024 19:00 (20 Minuten)

Very cold neutron (VCN) sources present an exciting opportunity for scientists to access unprecedented length and time scales, and achieve improved sensitivity in neutron experiments. VCNs are defined over a wide spectral range, from 1 meV (9 Å) down to a few hundred neV (> several 100 Å). Wavelengths of up to several tens of Å are of particular interest to many research communities. Recently, thermal scattering kernels were developed for candidate VCN moderator and reflector materials within the scope of the HighNESS project and beyond. These advances present an opportunity for the conceptual design of VCN sources at newly emerging high-current accelerator-driven neutron sources (Hi-CANS) like the High Brilliance neutron Source (HBS). The HBS is a Hi-CANS project which hosts a linear accelerator delivering a pulsed proton beam of energy, 70 MeV, and peak current, 100 mA, to a novel high-power tantalum target and compact target-moderator-reflector (TMR). The production of competitive and brilliant cold neutron beams from a low dimensional parahydrogen source has been designed and its stable operation at 18 K subsequently demonstrated at the Big Karl platform in December 2023. A concept for a compact very cold neutron source based on the low dimensional parahydrogen cold source for the HBS will be presented, wherein a methane disk moderator is embedded within a parahydrogen cold moderator. As methane is known to produce a colder neutron spectrum when compared with parahydrogen, it is considered in this concept to shift the cold neutron spectrum generated by the parahydrogen cold moderator. Results from a full optimization of the geometry of the very cold neutron moderator concept, by coupling the Monte Carlo transport code PHITS with Dakota, with the single objective of boosting the neutron intensity within the range 9-18 Å for a small angle scattering instrument will be presented.

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Sources & Upgrades