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CHES: A look into the next generation of neutron instruments

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CHES is the new proposed direct geometry inelastic spectrometer dedicated to the analysis of small samples with modest energy resolution (2.5-5% of E_i). This relatively short instrument will take full advantage of both the increased peak brilliance of the SNS Second Target Station (STS) coupled moderators, and of the recent advances in instrument design and technology, to achieve unprecedented performance for inelastic scattering in the cold energy range. The simulations predict that it will exceed that of CNCS by at least a factor of 200. Two sections of ballistic octagonal guides will transport the beam to the sample position at 29.6 m from the moderator.

A new concept for double disk choppers will select the wavelengths and deal with frame overlap. CHES will take full advantage of Repetition-Rate Multiplication (RRM) to analyze samples at multiple incident energies, maximizing the efficiency of the measurement. Finally, the detector tank will house a large array of curved 8-pack detector ^3He tubes giving a total solid angle coverage of 6.0 sr, and will incorporate Helmholtz coils for polarization analysis. Detailed Monte Carlo (MC) simulations of a real experiment on $\text{K}_2\text{V}_3\text{O}_8$ have been performed to optimize the instrument using McStas and MCViNE; these results were verified by running similar calculations on CNCS.

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