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Proposed muon collider proton driver R&D at SNS

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Generation of a muon beam at a Muon Collider requires relatively short, high-charge proton bunches. They are produced in a high-average-power proton driver by first accumulating a proton beam from a super-conducting linac, then bunching the beam and finally compressing and combining the bunches into a single high-intensity proton pulse. All of these beam formation stages involve handling of unprecedentedly high beam charges. Validation of these intricate beam manipulations requires better understanding of extreme space-charge effects and experimental demonstration. A facility perhaps most closely matching the proton driver configuration and beam parameters is the SNS accelerator complex at ONRL. Considering the energy scaling of the space-charge parameters, many of the beam formation steps planned for the proton driver can be experimentally checked at the SNS at the relevant space-charge interaction levels. This paper discusses potential proton driver R&D at the SNS.

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