

CESAITION IN THE SNS H⁻ ION SOURCE

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Abstract

The ion source for the Spallation Neutron Source (SNS) is a radio-frequency, multicusp source designed to deliver 45 mA of H⁻ with a nominal duty factor of 6% and a normalized rms emittance of less than 0.2π mm mrad to the SNS accelerator. The ion source—designed, constructed, and commissioned at Lawrence Berkeley National Laboratory (LBNL) has now entered routine operation commissioning the SNS accelerators. The use of Cs is required to produce H⁻ beams greater than 15 mA and is dispensed by heating Cs₂CrO₄ cartridges contained in a collar, which surrounds the outlet aperture of the source. Understanding source cesiation is essential to the delivery of long, sustained beams required for accelerator operation. This report provides a theoretical description of the cesiation process as well as measurements of H⁻ yield resulting from various collar heating profiles. H⁻ yields are correlated to Cs vapor densities measured using an in-line conductivity sensor.