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Negative ion sources for accelerators - status and future prospects

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Abstract. Today, negative ion sources, particularly those producing H- ions are used extensively in many large, accelerator-based, user facilities operating worldwide. Beams of H- ions have become the preferred means of filling circular accelerators and storage rings as well as enabling efficient extraction from cyclotrons. Such facilities include the US Spallation Neutron Source (SNS), Japan Proton Accelerator Research Complex (J-PARC), Rutherford Appleton Laboratory (RAL-ISIS), Los Alamos Neutron Science Center (LANSCE), Fermi National Accelerator Laboratory (FNAL), Brookhaven National Laboratory (BNL), the CERN LHC injector, the Chinese Spallation Neutron Source (CSNS) as well as numerous installations of D-Pace (licenced by TRIUMF) ion sources used mainly with cyclotrons. In addition, several future facilities as well as upgrades to existing facilities are being envisioned which will generally require higher performing H- ion sources, Low Energy Beam Transports (LEBTs) and Radio frequency Quadrupoles (RFQs). This report will first define the current state-of-the-art by specifying the beam parameters routinely injected into the accelerators of existing facilities as well as provide a simple description of their injector systems. Next, the parametric upgrade goals of existing and envisioned facilities will be discussed as well as research efforts at the SNS and world-wide and to meet these goals.

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