

Abstract Submitted
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Challenges/issues of NIS used in particle accelerator facilities

DAN FAIRCLOTH, Rutherford Appleton Laboratory — High current, high duty cycle negative ion sources are an essential component of many high power particle accelerators. This talk gives an overview of the state-of-the-art sources used around the world. Volume, surface and charge exchange negative ion production processes are detailed. Cesium magnetron and Penning surface plasma sources are discussed along with surface converter sources. Multicusp volume sources with filament and LaB6 cathodes are described before moving onto RF inductively coupled volume sources with internal and external antennas. The major challenges facing accelerator facilities are detailed. Beam current, source lifetime and reliability are the most pressing. The pros and cons of each source technology is discussed along with their development programs. The uncertainties and unknowns common to these sources are discussed. The dynamics of cesium surface coverage and the causes of source variability are still unknown. Minimizing beam emittance is essential to maximizing the transport of high current beams; space charge effects are very important. The basic physics of negative ion production is still not well understood, theoretical and experimental programs continue to improve this, but there are still many mysteries to be solved.

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