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The requirements and challenges of the next generation negative ion sources OLLI TARVAINEN, University of Jyvaskyla, Department of Physics — Negative ion sources are often subsystems of particle accelerators and neutral beam injectors. Thus, the requirements of the next generation negative ion sources are largely driven by upgrades and new developments of these technologies. The performance of negative ion sources is typically defined by the beam current and emittance, long and short-term stability of the extracted beams, the ratio of desired ions to co-extracted electrons and the maintenance interval of the ion source. The requirements of the next generation negative ion sources in each of these categories are described and compared to the state-of-the-art technologies. The physics of negative ion production are discussed briefly to outline the fundamental and technical challenges of the future negative ion sources. An overview of their development effort will be given with the main focus being in H^-/D^- ion sources, which are currently under active research and development in several laboratories. Some novel ideas and techniques to improve the performance of negative ion sources are described to facilitate discussion.

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