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Ion Source Requirements in High-Intensity Linacs

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High-intensity linear accelerators have a wide range of applications, including driver for accelerator-driven sub-critical reactors, transmutation of nuclear waste, injectors for colliders, and spallation neutron sources. High-intensity linacs are designed to minimize the losses to increase component longevity and allow hands-on maintenance. Depending on the application, emittance growth and control of the final emittance are major parameters to have under control during the design of the accelerator. Even though the losses are present along the entire linac, and the design of the linac governs how the emittance evolves, the ion source is undoubtedly the single component with the highest impact on defining the beam behavior along the linac. In this paper, by using the European Spallation Source as an example, we discuss how the requirements of the linac dictate the parameters of the ion source, from the extraction energy to the jitter on the extracted current.

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