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Performance of the Brillouin Electron Gun at the TwinEBIS Test Bench

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At the TwinEBIS test bench an electron gun of Brillouin-type has been operated since a few years. It is expected that this type of gun should yield the highest electron beam compression, therefore allowing for rapid production of bunched C6+ ions, as required by the "all-linac accelerator"used for cancer therapy. Significant performance improvements have been achieved at the test bench following the realignment of the Brillouin electron gun and the installation of a redesigned collector. These upgrades have resulted in excellent electron beam transmission and a reduction in ion losses. Charge breeding measurements using CH_4 and Xe gas injection have demonstrated that the system now achieves a high degree of space-charge neutralisation. We present simulations investigating previously reported poor performance and provide guidelines for how to achieve improved operational conditions for attaining high space-charge neutralization and high charge states. The potential for using the device as a source of C6+ ions is also reevaluated.

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