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Beam Simulations of the ALBA and BESSY II Electron Guns

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The ALBA and BESSY II Linacs consist of a thermionic Pierce-type electron gun that delivers e^- at 90 keV in pulses of 1 ns with a maximum charge of 0.25 nC/bunch. The gun is followed by a set of standing wave bunching cavities and traveling wave accelerating structures to further increase the beam energy, up to 50 MeV at BESSY II and up to 100 MeV at ALBA, while keeping the energy spread below 0.5% (rms). In this paper a study of the beam parameters at the exit of the electron gun is presented for different bunch charges, to evaluate the space charge effect. For that, electrostatic field maps have been obtained by means of Superfish, following the technical drawings provided by the manufacturer, Thales. Results from the simulations are compared to the values reported by the supplier at the exit of the gun, and also to real measurements performed at the BESSY II gun test-stand. The implementation of the field-maps of the gun at the Linac model (GPT tracking code) conducts more realistic simulations, improving the understanding of the two Linac beam performances.

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Footnotes

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Yes

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