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Superconducting solenoid fields measurement and optimization

To reduce the projected transverse beam emittance, a solenoid is usually used at normal conducting as well as superconducting radio frequency (SRF) photoinjectors. At the ELBE SRF Gun-II, a superconducting solenoid is located inside the gun's cryomodule about 0.1 m far from the end of the gun cavity. The aberration of the solenoid field, such as the quadrupole component, will influence the beam symmetry and enlarge the projected transverse emittance. To analyze the multipole components of the solenoid field, a simple method is used and works well. The influence of the quadrupole field on emittance is studied, and the correctors have been used to cancel this multipole field.

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