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Electron Gun Producing Beam with Controllable Current Density

The existing MEDeGUN Brillouin-type electron gun at the TwinEBIS test bench is, according to Herrmann theory, capable of producing an electron beam with a current density of 3850 A/cm² in the 2 T solenoid. To control the electron beam current density and the magnetic flux inside the beam, the existing electron gun - now using purely electrostatic focusing - can be modified by permitting magnetic flux to reach the cathode and by energizing the coil surrounding the cathode. In such a configuration, the stabilizing magnetic flux inside the electron beam can be controlled by changing the current in the cathode coil. The radial oscillations of the electron beam, resulting from the increased magnetic field on the cathode, can be significantly reduced by employing a non-adiabatic magnetic field near the electron gun. This method has been recently developed and successfully used at CERN. We present the computer simulations of this electron gun.

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