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Final Focus System for Thomson Scattering at ELBE

The design of a Final Focus System optimized for Thomson scattering at ELBE is presented. This telescope system consisting of four permanent magnet based quadrupoles will retain focusing properties like the position of the focal plane and spot size for electron energies between 20 and 30 MeV by adjusting the quadrupole positions individually on a motorized stage. Since the electron beam is chirped for bunch compression and therefore obtained a large rms energy spread of 400 keV, the 6D phase space dynamics were studied in second order to include chromatic effects.
We also present the design of the permanent magnet quadrupoles for the Final Focus System. Iron poles ensure a high field quality and adjustable shunts allow for fine adjustment of the field strength and compensation of deviations in the permanent magnet material.

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