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Optics Design for a Storage Ring Based Electron Cooler for Cooling at High Energies

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The Ring Electron Cooler (REC) is an option to provide beam cooling for the EIC at high energies. Based on a storage ring this machine can provide the beam current necessary for cooling at higher energies. While the electrons cool the ions the radiation cooling of the electrons is enhanced using strong wiggler magnets. The ring has a race track shape where one 176 meter long straight section is used for ion cooling and the other includes the wigglers with a peak field of 2.4 Tesla. In our solution the sextupoles and octupoles necessary for chromaticity correction are also located in the wiggler section, where the dispersion function is optimized in the multipoles without increasing the emittances too much through radiation excitation and intra beam scattering. A constant dispersion in the cooling section allows redistributing cooling power from the longitudinal to the transverse direction. A dispersion-free section is inserted into the arcs for RF cavities and injection.

Footnotes

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