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An achromatic space charge dominated low energy dogleg

Currently, Energy Recovery Linacs (ERLs) are gaining popularity due to their environmentally friendly and sustainable nature.
However, ERLs require a specialized low-energy injector, also known as a merger. The energy exiting the merger cannot be recycled and is ultimately dumped at the end of the process.
To maximize energy efficiency, it is necessary to reduce injection energy. However, a challenge arises due to the presence of space charge in the dispersive section at low-energy ERL injection, leading to dispersion leaks.

Various solutions for merger beamline design have been developed worldwide to address this issue. Here, we present a novel approach that employs a standard dogleg to create an ultra-low energy merger for an ERL. This was made possible by utilizing the GIOTTO AI code to optimize optics settings and achieve a proper achromatic configuration.

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