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Development of a flux-concentrator-based 2-Tesla solenoid as a round lens for ultrafast microscopy

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Ultrafast Microscopy using MeV beam has made significant progress in the past 5 years. However, in order to push to atomic level resolution, other than the requirements of beam source, there are also high demands in high strength focusing elements. In comparison of commercial 100s KeV level electron microscopes, an MeV imaging beamline requires Tesla level lenses, preferably round solenoid lens. Tesla class DC solenoids are prohibitively bulky and heavy, and superconducting solenoids are not cost effective. We have developed a novel miniature flux concentrator based solenoid lens system for MeV UED/UEM applications. It can reach 2-Tesla with $1e-5$ level stability (depending on the pulsed current source). Here we will present detailed development process and experimental results.

Footnotes

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