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Dark sector searches based on dielectric laser acceleration

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We discuss the beam requirements for indirect searches of dark matter and feebly coupled particles using advanced accelerator concepts. A parameter comparison reveals dielectric laser acceleration as a promising candidate for delivering the needed single-electron beams in the 5-100 GeV energy range or beyond. We suggest a parameter set for a baseline DLA-based dark sector accelerator. Enhancements through combining dielectric laser deflectors with a segmented detector or by making the dielectric structure be part of the laser oscillator could offer a performance significantly exceeding the “Extended LDMX” proposal based on LCLS-II.

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Footnotes

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