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Plasma accelerator demonstration facility at intermediate energy

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It is envisioned that a future energy-frontier lepton collider would require a center-of-mass energy beyond 10 TeV. Plasma accelerators are a leading candidate technology to reach these beam energies, owing to their ability to produce gradients on the order of 10 GV/m, leading to compact accelerator structures. To realize a future plasma-based collider, intermediate facilities are required to test the technology and demonstrate key subsystems. A 20-100 GeV center-of-mass energy plasma-based lepton collider is a possible candidate for an intermediate test facility. In addition to the utility as a test beam facility for accelerator and detector studies, a collider at intermediate energies can provide opportunities for particle physics studies using fixed targets, precision quantum chromodynamics, beyond standard model physics measurements, and investigation of charged particle interactions with extreme electromagnetic fields. Gamma-gamma and electron-ion collider designs may also be considered for such an intermediate energy facility.

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