

Searches for electroweak states at future plasma wakefield colliders

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We quantify the discovery potential of future multi-TeV plasma wakefield colliders for new electroweak multiplets. We include beam-beam effects through realistic luminosity spectra, comparing five collider configurations: e^+e^- and e^-e^- machines with round- and flat-beams, and a $\gamma\gamma$ collider. The beam-beam effects qualitatively change search strategies relative to idealized mono-energetic lepton colliders, highlighting the importance of the low-energy part of the luminosity spectrum and additional beam-induced initial-state channels. Our results have implications for accelerator R&D priorities, since key electroweak targets may remain accessible even if efficient positron acceleration and flat-beam delivery prove technically challenging at the multi-TeV scale.

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