

The 10-TeV Wakefield Accelerator collider design study

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Since its inception, the field of Advanced Accelerators has regarded future particle-physics colliders as the ultimate application of > 1 GV/m accelerator technology [1]. Over the last decades, rapid experimental and theoretical progress [2,3,4] drove a conceptual evolution of potential future colliders based on Wakefield Accelerator (WFA) technology. The recent P5 Report [5] calls for “vigorous R&D toward a cost-effective 10 TeV pCM collider based on proton, muon, or possible wakefield technologies.” Specifically, the P5 Report requests “the delivery of an end-to-end design concept, including cost scales, with self-consistent parameters throughout.” This presentation will outline the opportunities, requirements, and challenges for a 10 TeV WFA collider and will introduce a community-driven design study based on working groups and performance metrics including a timeline with deliverables.

Footnotes

- [1] R. Ruth et al., “A Plasma Wake Field Accelerator” *Particle Accelerators*, 17, 171-189 (1985).
- [2] E. Esarey et al., “Physics of laser-driven plasma-based electron accelerators”, *Rev. Mod. Phys.*, 81, 1229 (2009).
- [3] C. Jing, “Dielectric Wakefield Accelerators”, *Rev. Accel. Sci. Tech*, 9, 127-149 (2016).
- [4] M. Hogan, “Electron and Positron Beam-Driven Plasma Acceleration” *Rev. Accel. Sci. Tech*, 9, 63-83 (2016).
- [5] P5 Report <https://www.usparticlephysics.org/2023-p5-report/>

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