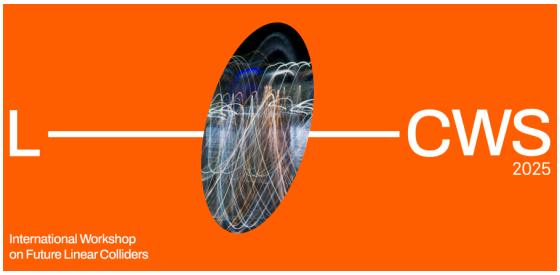

Contribution ID: **9** Type: **Talk**

The 10-TeV Wakefield Accelerator Collider Design Study

Tuesday 21 October 2025 09:00 (20 minutes)

Since its inception, the field of Advanced Accelerators has regarded future particle-physics colliders as the ultimate application of > 1 GV/m accelerator technology. Over the last decades, rapid experimental and theoretical progress [1,2,3] drove a conceptual evolution of potential future colliders based on Wakefield Accelerator (WFA) technology. The recent P5 Report [4] 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 contribution will outline the opportunities, requirements, and challenges for a 10 TeV WFA collider, both as a standalone machine and as an upgrade path within the LCVision framework, and will introduce a community-driven design process based on working groups and performance metrics including a timeline with deliverables. We will describe progress in the design study, including developments on the physics case at 10 TeV, beam-beam interactions with large beamstrahlung, and considerations on wakefield accelerator staging options.

[1] C. A. Lindstrøm et al. "Beam-driven plasma-wakefield acceleration", arXiv:2504.05558 (2025)
[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 (2016)
[4] P5 Report www.usparticlephysics.org/2023-p5-report/

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