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## Advanced accelerators for high energy physics and Snowmass AF06

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New R&D concepts for particle acceleration, generation, and focusing at ultra high acceleration gradients (GeV/m and beyond) have the potential to enable future  $e^+e^-$  and  $\gamma - \gamma$  colliders to and beyond 15 TeV energies. In addition to proven high gradient and ultra-bright beam generation, these systems have the potential to increase luminosity per unit beam power via short beams, for practical energy recovery to extend the reach of high energy physics, and for fast cooling. They hence have potential to reduce the dimensions, CO<sub>2</sub> footprint, and costs of future colliders, with added potential to reduce power consumption. The last decade has seen tremendous experimental progress in performance, together with development of concepts to address potential collider issues. Conceptual parameter sets for colliders have been developed for  $e^+e^-$  and  $\gamma\gamma$  colliders at a range of energies, which present potentially competitive options with prospects for future cost reduction. In addition to a strengthened ongoing R&D program, continuing to develop these collider concepts in interaction with the collider and high energy physics communities, starting with an integrated set of parameters, is important; as is development of technologies through nearer-term applications. Progress in these concepts, next steps, and results of Snowmass Accelerator Frontier topical group # 6, Advanced Accelerator Concepts (<https://doi.org/10.48550/arXiv.2208.13279>) will be discussed.

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### I have read and accept the Privacy Policy Statement

Yes

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