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Advanced accelerator concepts I

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Recent years have seen spectacular progress in the development of innovative acceleration methods that are not based on traditional RF accelerating structures. These novel developments are at the interface of laser, plasma and accelerator physics and may potentially lead to much more compact and cost effective accelerator facilities. While primarily focusing on the ability to accelerate charged particles with much larger gradients than traditional RF structures, these new techniques have yet to demonstrate comparable performances to RF structures in terms of both beam parameters and reproducibility. To guide the developments beyond the necessary basic R&D and concept validations, a common understanding and definition of required performance and beam parameters for an operational user facility is now needed. These innovative user facilities can include "table-top" light sources,

medical accelerators, industrial accelerators or even high-energy colliders.

This paper will review the most promising developments in new acceleration methods and it will present the status of on-going projects.

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