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Tailored electron bunches from a superconducting linac for beam-driven-acceleration methods with enhanced transformer ratios

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In this contribution we describe a possible layout of a superconducting linac that could provide shaped high-charge (up 5 nC) electron “drive” bunches to excite wakefield in a dielectric or plasma wakefield accelerator. The work capitalize on a new class of smooth shape recently proposed [F. Lemery and P. Piot, ArXiV arXiv:1505.06218 (2015)]. Start-to-end simulations and performances ofthe proposed accelerator are presented. The improvement in transformer ratios
supported by the produced current profiles is also discussed along with possible applications to, e.g., compact multi-user free-electron laser [A. Zholents, et al., Proc. FEL14, 993 (2014)].

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