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Beam-driven plasma wakefield acceleration at Megahertz repetition rates

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Despite the great advances that have been made in beam-driven plasma wakefield acceleration (PWFA) in the past decade in terms of acceleration gradient, efficiency, and beam quality preservation, so far the repetition rates of PWFAs were limited to a few Hz. In contrast, user facilities based on conventional acceleration technology routinely supply 1,000's of bunches to 100's of thousands (1 million) of bunches for experiments per second. For PWFA's to be competitive and compatible with the average brightness of these conventional machines, their repetition rates also have to be advanced to the kHz and MHz regime. The FLASH linac at DESY, which provides the electron bunches for the FLASHForward PWFA experiment, is capable of producing bunch trains of 100's of bunches at MHz repetition rates. In this contribution we show the current status of beam-driven plasma wakefield acceleration at FLASHForward with MHz repetition rates.

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