

Megahertz repetition rate discharge plasma cells for plasma-based particle accelerators

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Particle acceleration in wakefields excited in a plasma medium is one of the prime candidates to complement or even replace conventional radiofrequency accelerators in future accelerator facilities due to the far superior acceleration gradients achievable in plasma. In contrast to conventional acceleration techniques, which routinely supply experiments with up to 100's of thousands of bunches per second, allowing data taking in a short period of time, plasma accelerators at the moment usually operate at repetition rates of a few Hz. To enable high-gradient-acceleration at competitive repetition rates, the plasma acceleration medium has to be supplied with high reproducibility at similarly high repetition rates. Here, we report on the development of gas discharge plasma cells capable of producing plasma acceleration media with MHz repetition rate in bursts of tens of discharges.

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