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The wakefield excited by an ultra-short HPM pulse in an under dense plasma filled cylindrical waveguide

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With the availability of very high power (˜10^9 W) and short duration (≤10^{-9} s) microwave sources it is possible to study the non-linear interaction of powerful EM waves with under dense plasmas in a regime not studied so far. In contrast to the laser-plasma wakefield experiments, this approach addresses a significantly lower power, plasma density and electric field gradient regime but a larger time and space scale which allows for a more accessible experimental platform. We have built a super-radiant BWO, supplying microwave pulses of ˜1 ns duration, ˜0.7 GW power and ˜10 GHz frequency which we intend to apply at the upstream end of a cylindrical waveguide filled with plasma of 10^{11}-10^{12} cm^{-3} density. We present a model which describes the physics of the formation of the wakefield traveling in the waveguide and Lsp-PIC simulations to verify the feasibility of our experiment.

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