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Beat-wave Acceleration at the Tip of Endoscope

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The microscopic acceleration by a beat-wave excited LWFA (Laser Wakefield Acceleration) has been demonstrated by the 1D/2D and quasi-3D PIC simulations. Electrons in such simulations reach 10s keV and even 100s keV energies. We show the mechanism in this beat wave-wave acceleration in the near critical density materials (such as the carbon nanotubes) and various physics dependences such as on the density, the length of acceleration, the end of the specimens (s. a. sheath effects), and the multi-dimensional effects. Some of our preliminary discussions are shown in our "White Paper: Toward micron-scale electron therapy at the tip of endoscopy"(2026).

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