Abstract Submitted
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Laser-Wakefield Application to Endoscopic Oncology[1] DANTE ROA, BRADLEY SCOTT NICKS, TOSHIKI TAJIMA, University of California, Irvine, ALES NECAS, TAE Technologies, Inc. , GERARD MOUROU, Ecole Polytechnique — Recent developments in fiber laser and nanomaterials have opened the possibility of using laser wakefield acceleration (LWFA) as the source of low-energy electron radiation for endoscopic and intraoperative cancer therapy, a scheme in which sources of radiation for cancer treatment are brought directly to the affected tissues, avoiding collateral damage to intervening tissues. To this end, the electron dynamics of LWFA is examined in the high-density regime. In the near-critical density regime, electrons are accelerated by the ponderomotive force followed by an electron sheath formation, resulting in a flow of bulk electrons. These low-energy electrons penetrate tissue to depths on the order of millimeters. First a typical resonant laser pulse is used, followed by lower-intensity, longer-pulse schemes, which are more amenable to a fiber-laser application. [1]

[1]Foundational work laid by B. S. Nicks, S. Hakimi, E. Barraza-Valdez, K. D. Chestnut, G. H. DeGrandchamp, K. R. Gage, D. B. Housley, G. Huxtable, G. Lawler, D. J. Lin, P. Manwani, E. C. Nelson, G. M. Player, M. W. L. Seggebruch, J. Sweeney, J. E. Tanner, K. Thompson, and T. Tajima, Electron Dynamics in the High-Density Laser-Wakefield Acceleration Regime, Submitted to Phys. Rev. Accel. Beams (2019)

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