

Abstract Submitted  
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**Resonant Excitation of Plasma Wakefields**<sup>1</sup> PATRIC MUGGLI, University of Southern California, VITALY YAKIMENKO, MIKHAIL FEDURIN, KARL KUSCHE, MARCUS BABZIEN, BNL, BRIAN ALLEN, University of Southern California, YUN FANG, University of Southern California — The resonant excitation of plasma wakefields by a train of equidistant electron bunches can lead to large energy loss and energy gain. The bunch train can in principle also be tailored to produce a large transformer ratio  $R$  ( $\gg 2$ ). The energy gain by a witness bunch can in principle reach  $R$  times the drive bunch energy and high energy bunches can be produced with low energy drivers. The physics of these situations is tested with low energy beams at the Brookhaven National Laboratory Accelerator Test Facility. The plasma density is varied in a capillary discharge and the resonance is observed when the relativistic wave plasma period is equal to the drive bunch spacing. Differences in energy loss and gain between the bunch train and the initial long bunch are also observed. Detailed experimental results will be presented.

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Patric Muggli  
University of Southern California

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