

# Emittance preservation of an electron bunch in a loaded quasi-linear plasma wakefield

Veronica K. Berglyd Olsen\* and Erik Adli  
*University of Oslo, Oslo, Norway*

Patric Muggli  
*Max Planck Institute for Physics, Munich, Germany and  
CERN, Geneva, Switzerland*  
(Dated: June 14, 2017)

We investigate beam loading and emittance preservation for a high-charge electron beam being accelerated in quasi-linear plasma wakefield driven by a short proton beam. The structure of the wakefield is similar to that of a long, modulated proton beam. By selecting transverse and longitudinal electron beam parameters in order to appropriately load of the wake, we show that the bulk of the electron beam can be accelerated without significant emittance growth.

## I. INTRODUCTION

- interested from SMI/AWAKE
- requirements for AWAKE Run 2

## III. BEAM LOADING

- discussion of the main physics and results; beam loading, bubble creation, emittance preservation

## II. METHOD

- explain analogy of short-bunch, SMI case, by referring to earlier Veronica-papers
- simulation setup PIC/quickpic OS

## IV. DISCUSSION

## V. CONCLUSION

- discussion of optimal electron beam parameters
- implications for AWAKE Run 2

---

\* v.k.b.olsen@cern.ch