Photonic Band Gap Accelerating Structures Progress Report

1Q FY18

In the first quarter of FY18 the postdoc (Janardan Upadhyay) visited ANL to conduct an experiment on measuring the wakefields at Argonne Wakefield Accelerator. Simulations of the wakefield in six 1.3 GHz accelerator sections were conducted first indicating that for the 10 nC drive beam the witness beam will have the lower final energy. The maximum difference between the energies of the drive beam and the witness beam was estimated to be 0.18 MeV (Figure 1). The experiment confirmed the presence of the beam loading in the 1.3 GHz accelerators. The measured energy of the witness beam was lower than the energy of the drive beam (Figure 2). The PBG experiment was now planned to account for the energy difference between the drive and the witness beam in front of the PBG structure. The PBG experiment was planned for January of 2018.

The fabrication of the structure for the high gradient testing at SLAC National Accelerator Laboratory is now complete and the structure was delivered to SLAC National Accelerator Laboratory. Dr. Valery Dolgashev is overseeing the tuning and brazing of the structure. LANL team awaits the completion of the brazing to conduct the high gradient testing of the structure at SLAC.

The PI (Evgenya Simakov) has worked with Valery Dolgashev and Sami Tantawi at SLAC to complete the review paper on high gradient accelerator structure for a special issue of the Nuclear Instruments and Methods in Physics Research – A. The paper is submitted.

The PI and the postdoc submitted an abstract for the 2018 International Particle Accelerator Conference in Vancouver, CA.
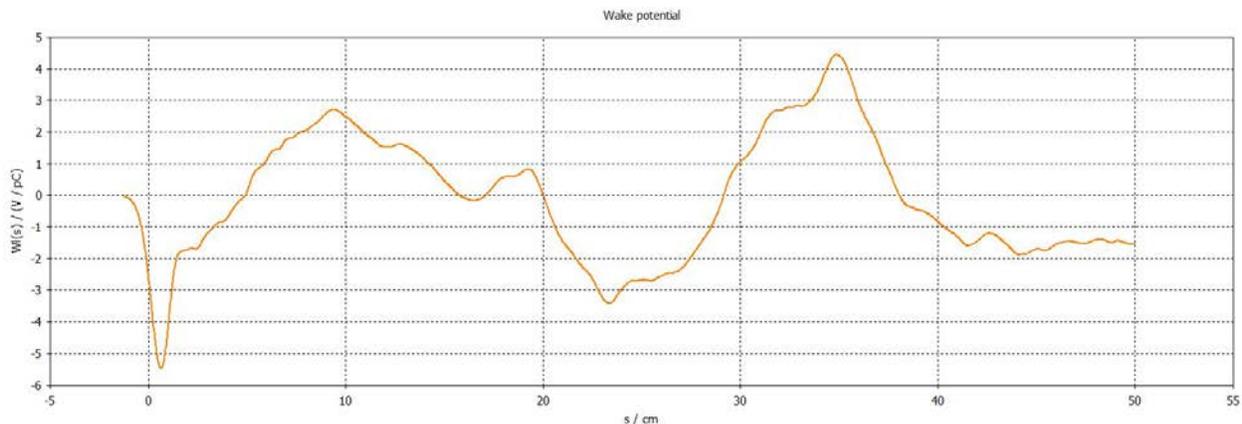

Figure 1: CST Particle Studio simulation of the wake potential at Argonne Wakefield Accelerator indicating the maximum energy loss of 0.18 MeV for the witness beam following the 10 nC drive beam.

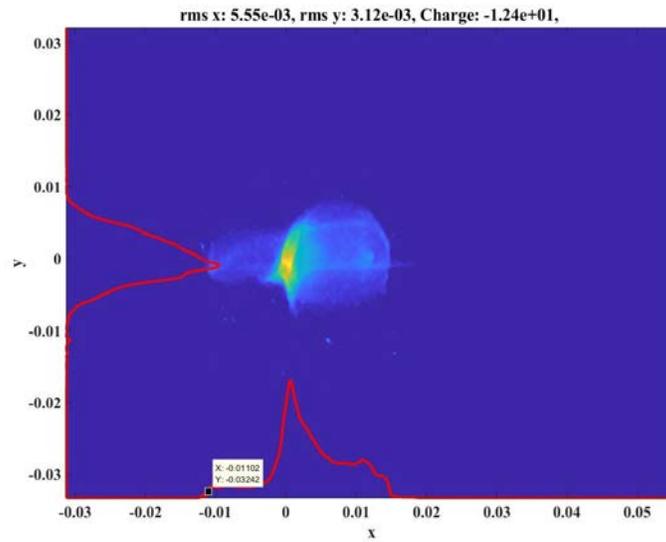rms x: 5.55e-03, rms y: 3.12e-03, Charge: -1.24e+01,

Figure 2: The spectrometer screen image of the drive beam and the witness beam accelerated by the Argonne Wakefield Accelerator. The witness beam has 0.12 MeV lower energy than the drive beam indicating the beam loading. The charge of the drive beam is 10 nC and the charge of the witness beam is 2 nC.