

# **Photonic Band Gap Accelerating Structures Progress Report**

4Q FY17

In the fourth quarter of FY17 the postdoc (Janardan Upadhyay) conducted simulations of the beam propagation in Argonne Wakefield Accelerator (AWA) in preparation for another visit to Argonne National Laboratory. The simulations were conducted with OPAL. The simulations demonstrated that it should be possible to focus the beam with the beam charge up to 20 nC through the Be window and pass it through the PBG structure (Figure 1). Simulations also showed a non-negligible beam loading in the main section of the AWA. A trip to AWA was scheduled for October 2017 to confirm simulations. Another trip will be scheduled soon after to conduct the wakefield acceleration experiment.

The fabrication of the structure for the high gradient testing at SLAC National Accelerator Laboratory is now complete and the delivery is scheduled for early October, 2017. The tuning, brazing, and high gradient testing at SLAC will follow.

The PI (Evgenya Simakov) has worked with Valery Dolgashev and Sami Tantawi at SLAC to prepare a review paper on high gradient accelerator structure for a special issue of the Nuclear Instruments and Methods in Physics Research – A. The submission is planned for October, 2017.

The PI and the postdoc attended the 38<sup>th</sup> Free Electron Laser Conference in Santa Fe, NM in August. The postdoc presented a paper on the results of his recent work on this project and published a conference proceeding.

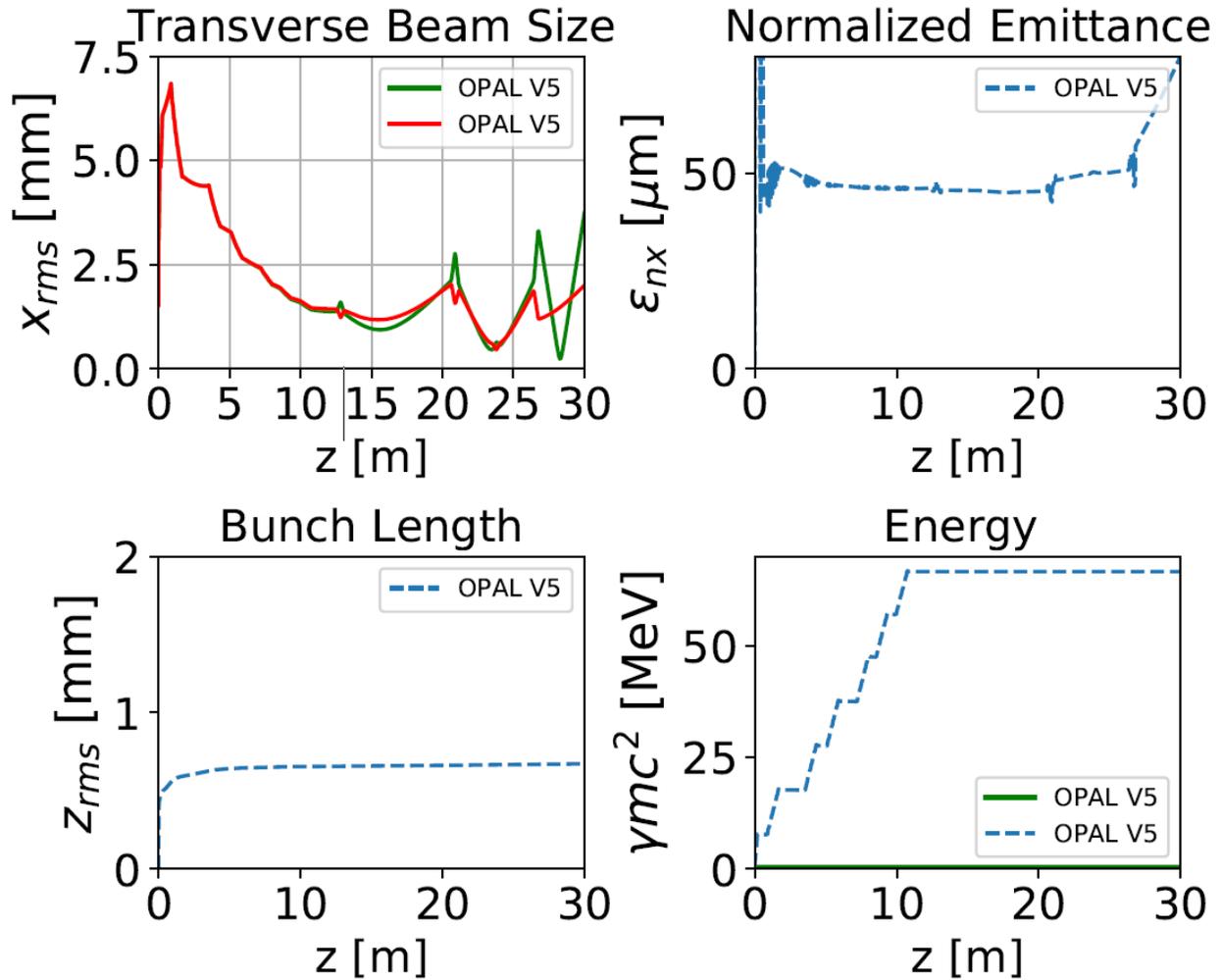


Figure 1: OPAL simulations of propagation of a 20 nC electron beam through the beamline at Argonne Wakefield Accelerator. The Be window is located at 23.4 m from the beginning of the beamline, and the PBG structure is located at 25.3 m. The beam is focused by three quadrupole magnets located in front of the Be window.