

Photonic Band Gap Accelerating Structures Progress Report

3Q FY17

In the third quarter of FY17 the postdoc (Janardan Upadhyay) went to Argonne Wakefield Accelerator to conduct the wakefields experiments with the 11.7 GHz Photonic Band Gap accelerating structure. The postdoc conditioned the new spectrometer to measure beam's energy after the PBG structure. Measured distribution of the magnetic field inside of the spectrometer is shown in Figure 1. The postdoc studied beam transport through the new Be window and focusing the electron beam through the PBG structure. Up to 10 nC of charge was passed through the structure. The multi-bunch experiment was conducted to measure the acceleration and deceleration of electron bunches by the wakefield excited by the first bunch in the PBG structure. So far only the deceleration of the witness bunches was observed (see Figure 2), but the decelerating gradients seem to be in agreement with theoretical prediction. We work on putting together the experimental setup to increase the phase difference between the drive and the witness bunches to put the witness bunch into an accelerating phase. Simulations are conducted in OPAL to optimize the beamline.

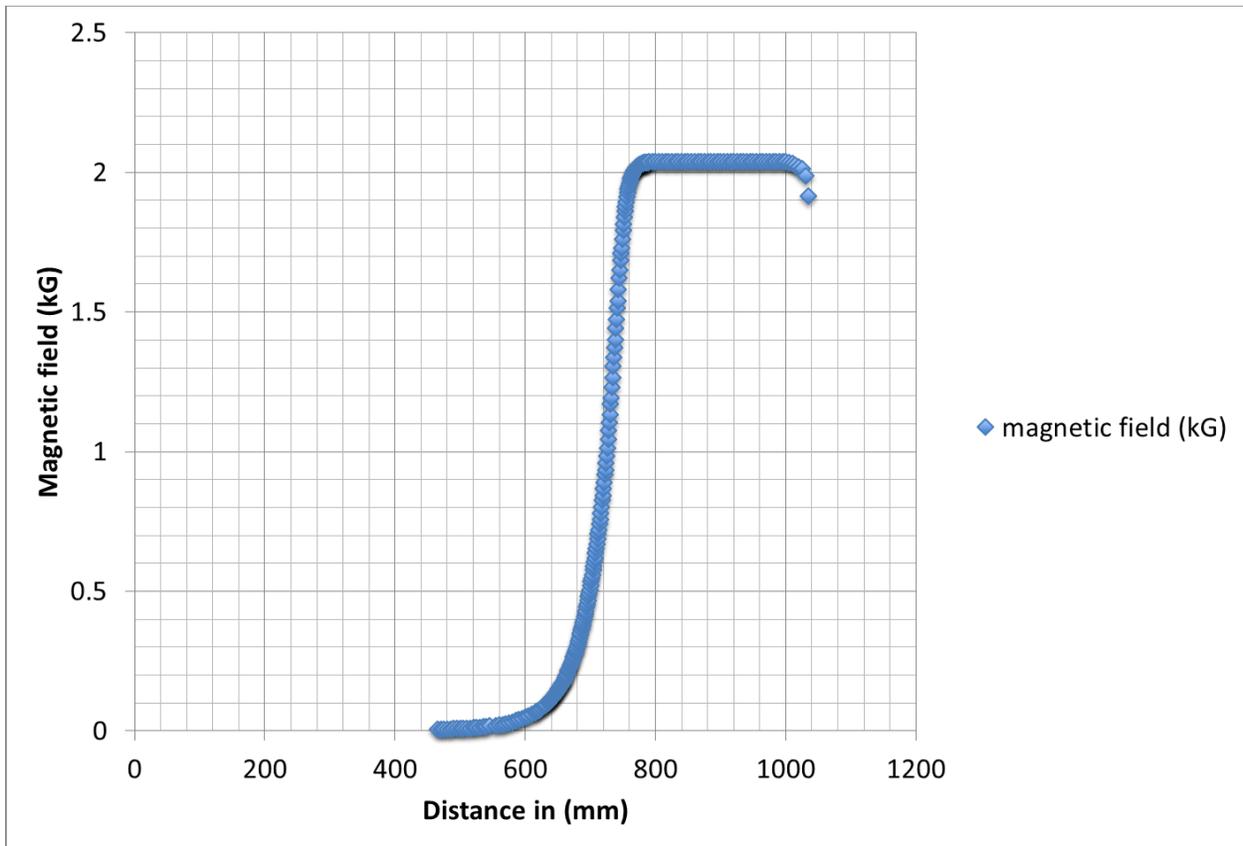


Figure 1: Distribution of the magnetic field inside of the spectrometer magnet.

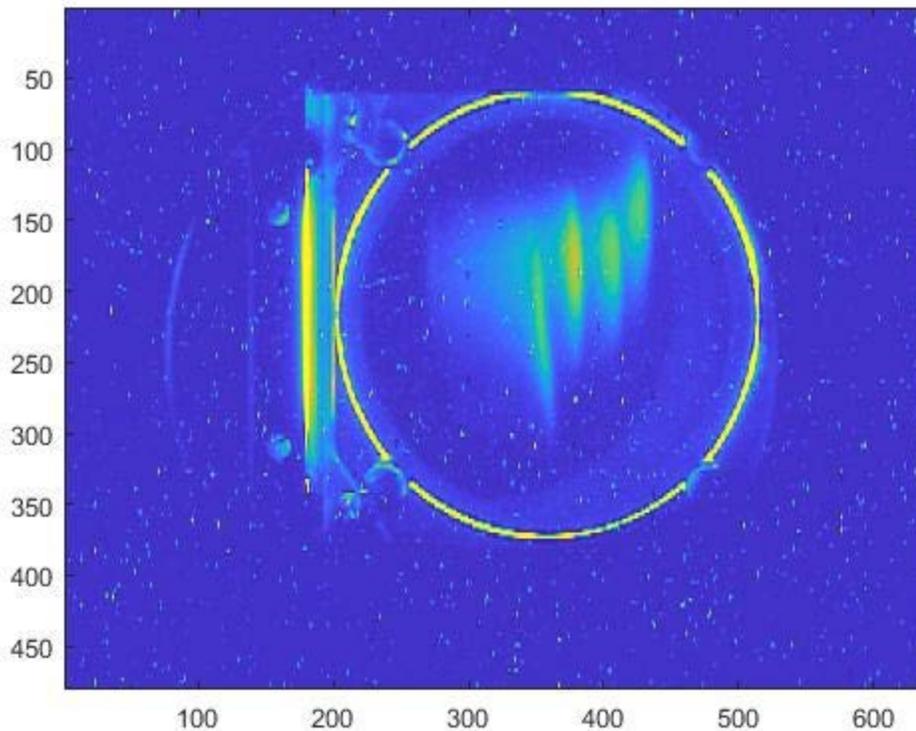


Figure 2: The image of the four electron bunches on the screen of the spectrometer installed after the PBG structure. Each bunch is decelerated by approximately the same energy with respect to the previous bunch due to the wakefields excited by the previous bunches.

The delivery of the high gradient structure for testing at SLAC National Accelerator Laboratory was delayed by the vendor. The new delivery estimate is August, 2017. The high gradient testing of the fabricated structure will follow.

The PI (Evgenya Simakov) is leading the Organizing Committee for the 2018 Advanced Accelerator Concepts workshop to be held in Breckenridge, CO in August 2018. The full Program Committee for the workshop has been selected. The Program Committee meeting is scheduled for October 22, 2017.