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High Gradient Dielectric Structure Based Wakefield Experiments at ANL¹

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The Argonne Wakefield Accelerator Facility (AWA) is dedicated to the study of electron beam physics and the development of accelerating structures based on electron beam driven wakefields. In order to carry out these studies, the facility employs a photocathode RF gun capable of generating electron beams with high bunch charges (up to 100 nC) and short bunch lengths. This high intensity beam is used to excite wakefields in the structures under investigation. The wakefield structures presently under development are dielectric loaded cylindrical waveguides with operating frequencies of 10 -15 GHz. Recent experiments have shown ~ 100 MV/m gradient in a dielectric structure without any sign of break down with the wakefield pulse length of several nano-seconds. We present the detailed experimental results and future plan for the potential HEP accelerator applications.

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