



Contribution ID: 176

Type: **talk**

Dielectric wakefield accelerator experiments in modal confinement and pulse shaping

Monday, 14 September 2015 18:30 (15 minutes)

Significant experimental milestones in beam-driven wakefield acceleration in dielectric structures have been demonstrated in recent years. Such experimental work is necessary to ascertain the viability of such schemes as next generation accelerators. Some outstanding issues that require further investigation include control of resonant mode confinement and enhanced energy efficiency. In this paper, we will describe experimental efforts that took place at the Brookhaven National Laboratory Accelerator Test Facility. The first measurement successfully demonstrates resonant excitation of specific terahertz frequency modes in a dielectric structure using Bragg-reflective boundaries. The second measurement focusses on phase space manipulations to enhance transformer ratios using shaped beam profiles from a dielectric structure and compact magnetic chicane.

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Session Classification: WG3 - Electron beams from electromagnetic structures, including dielectric and laser-driven structures

Track Classification: WG3 - Electron beams from electromagnetic structures, including dielectric and laser-driven structures