Argonne NATIONAL LABORATORY

HEP Seminar

## High Energy Physics Lunch Seminar

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### SLAC

## "Experiments with Metamaterial Accelerating Structures at Argonne Wakefield Accelerator"

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### Host: Jiahang Shao

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### May 28, 2019 – 12:00 p.m.-1:00p.m. Building 362/F-108


**Abstract:**

**In this talk, the experimental demonstration of a metamaterial-based metallic structure for wakefield acceleration will be presented. The structure supports a fundamental transverse magnetic mode with a negative group velocity leading to reversed-Cherenkov radiation. At the Argonne Wakefield Accelerator, 65 MeV electron bunches were sent through the structure to excite high-power reversed-Cherenkov wakefield radiation at 11.4 GHz. Single 45 nC electron bunches traversing the structure generated up to 25 MW in 2 ns pulses, in good agreement with theory. Two bunches of 85 nC in total with appropriate temporal spacing generated up to 80 MW by coherent wakefield superposition, the highest rf power that metamaterial structures ever experienced without damage. These results demonstrate the unique features of metamaterial structures that are very attractive for future high-gradient wakefield accelerators, including two-beam and collinear accelerators. Advantages include the high shunt impedance for high power generation and high-gradient acceleration, the simple and rugged structure, and a large parameter space for optimization.**


**HEP Lunch seminar info:**

Please use the doodle poll to sign-up for lunch at
https://doodle.com/poll/hg4w9miqri5nuq7g

Chicken Sandwich $8, Sub Sandwich $9, Salad $7, Slice of Pizza- $5 (all include coffee). Coffee 25¢. Pop or Water 75¢.

**The HEP Lunch Seminar Schedule can be viewed at:**
https://indico.fnal.gov/event/20864/