PHYSICS COLLOQUIUM: Laser-Plasma Accelerators: Next Generation X-Ray Light Sources

Félicie Albert
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Date:
10/23/2020

Time:
10:30 AM - 11:50 AM

Link:
Please email snsgradstaff@ucmerced.edu for Zoom link and passcode

About The Speaker:

Félicie Albert is the deputy director for LLNL's High Energy Density (HED) Science Center and a scientist in LLNL's National Ignition Facility and Photon Science Directorate, as well as the Joint HED Sciences organization.

Her areas of expertise include the generation and applications of novel sources of electrons, x-rays, and gamma-rays through laser-plasma interaction, laser-wakefield acceleration, and Compton scattering. She has conducted many experiments using high-intensity lasers at various facilities around the world.

Albert received the Presidential Early Career Award for Scientists and Engineers (PECASE) in 2019, was awarded a 2016 DOE Early Career Research Program Award to develop new x-ray sources for HED science experiments, and leads several Laboratory Directed Research and Development projects at LLNL.
She received the 2017 APS-DPP Katherine E. Weimer Award for outstanding contributions to plasma science research and the 2017 Edouard Fabre Prize for contributions to the physics of laser-produced plasmas. She was selected by the APS as an outstanding referee in 2015.

Albert joined LLNL in 2008 as a postdoctoral researcher in the photon science and applications program to work on nuclear resonance fluorescence experiments. She became a permanent member of the technical staff in 2010.

Albert earned her PhD in physics in 2007 from the Ecole Polytechnique in France, her MS in optics from the University of Central Florida in 2004, and her BS in engineering from the Ecole Nationale Supérieure de Physique de Marseille, France, in 2003.

She serves on many technical review panels, conference committees, and editorial boards, and is regularly involved in outreach activities for specialized audiences. She has more than 70 refereed publications and has given more than 35 invited talks at international conferences. She is a member of the International Committee of Ultra Intense Lasers (ICUIL), current chair of LaserNetUS, a senior member of OSA, and a Fellow of the American Physical Society.

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Abstract:

Particle accelerators have been revolutionizing discovery science, medicine, industry and national security for over a century. An estimated 30,000 particle accelerators are currently active around the world. In these machines, electromagnetic fields accelerate charged particles, such as electrons, protons, ions or positrons to velocities nearing the speed of light.

One of the most prominent applications of modern particle accelerators is the generation of radiation. For example, in a synchrotron or an x-ray free electron laser (X-FEL), high energy electrons oscillating in periodic magnetic structures emit bright x-rays.

Although their scientific appeal will remain evident for many decades, one limitation of synchrotrons and X-FELs is their typical mile-long size and their cost, which often limits access to the broader scientific community.

A plasma (a neutral medium composed of negatively charged free electrons and positively charged ions) can sustain electrical fields three orders of magnitude higher than that in conventional radiofrequency accelerator structures. Acceleration of electrons in plasmas, in particular in laser-driven plasmas, has been drawing considerable attention over the past decade because it dramatically reduces the size of accelerators and has the potential to revolutionize applications in medicine, industry, and basic sciences.

In this presentation, we review the prospects of using plasmas produced by intense lasers as particle accelerators and x-ray light sources, as well as some of the applications they will enable.

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