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## Laser-Plasma Accelerators: Particle Acceleration in a Nutshell

*Thursday, March 14, 2024 11:00 AM (1 hour)*

High-power lasers, relativistic electron beams, ultrashort X-ray pulses, plasma accelerators ... Oh My!

In this talk I will discuss laser-plasma accelerators –a novel technology that has the potential to become the next generation of particle accelerators.

Particle accelerators are key drivers for research and innovation and while mostly hidden from view, they have enabled many scientific discoveries and technological breakthroughs that have changed our way of life. However, they are often costly and high-energy machines are kilometer-scale facilities of which only a few exist worldwide.

Laser-plasma acceleration (LPA) can shrink the cost and dimension of accelerators by nearly three orders of magnitude compared to current technology. In LPAs, an ultrashort high-power laser is focused into a plasma, where it generates a plasma wave in its wake. Electrons can be injected into this plasma wave and are accelerated by its massive electric field to relativistic energies over a distance of only a few millimeters to centimeters.

I will present an overview of the field of laser-plasma acceleration and its current state-of-the art, introduce some applications of LPAs, including compact X-ray sources, and give an outlook over future developments.

**Presenter:** FUCHS, Matthias

**Session Classification:** Plenary Meeting