Laser-Driven Electron and Ion Acceleration: Established Results and Progress

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Laser-driven particle accelerators are emerging as a promising approach offering extremely high-gradient accelerating fields resulting in compact sources of high-energy electrons and ions characterized by ultra-short bunches duration, high peak current and high brightness[1,2]. Electrons are accelerated exploiting plasma wakefield acceleration that allowed to achieve multi-GeV beams chracterized by femtosecond durations and low emittance. Such beams are promising candidates for applications such as compact free-electron lasers [3], ultrafast imaging and novel radiation therapies [4]. Similarly, laser-driven ion acceleration, through mechanisms like target normal sheath acceleration (TNSA), radiation pressure acceleration (RPA) and hybrid approaches, produces energetic beams suitable for uses ranging from cultural heritage [5] to medicine [6] and high-energy-density physics.
In this talk an overview of the fundamental mechanisms behind electron and ion acceleration will be provided. Recent experimental achievements will then be discussed together with a perspective on the most promising applications.

Reference:

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