Contribution ID: **124** Type: **Poster**

Third harmonic generation for two-color ionization injection in laser-plasma accelerators

Tuesday, 23 July 2024 18:00 (1h 30m)

Laser plasma accelerators (LPAs) have promise to be the next generation accelerator for colliders, as well as drive a number of basic science, industry, security and medical applications. Many applications require high brightness electron beams enabled by low emittance. One proposal to achieve ultra-low emittance from an LPA is a two color laser configuration, where a long wavelength laser, with large ponderomotive force, is used to excite a plasma wakefield, while another trailing short wavelength laser is used to ionize inner shell electrons, injecting them in the accelerating phase of the wake [1]. The short wavelength allows for a high electric field for ionization, with low ponderomotive force. Many LPAs use Ti:Sapphire based lasers with central wavelength 0.8 μm. We will present experimental results and simulations performed at the BELLA Center on generating the third harmonic of short (45 fs), high fluence (30 mJ/cm2), Ti:Sapphire based laser pulses for the purpose of ionization injection in a quasi-linear wake. Features and challenges unique to short pulse, high fluence harmonic generation and characterization as well as how those challenges were addressed will also be presented.

[1] L.L. Yu, Two-Color Laser-Ionization Injection, PRL 112, 125001 (2014)

This work was supported by the U.S. Department of Energy (DOE), Office of Science, Offices of High Energy Physics, under Contract No. DE-AC02-05CH11231and by the National Science Foundation (NSF) under grant DGE 1752814.

Working group

WG1 : Laser-driven plasma wakefield acceleration

Primary authors: FAN-CHIANG, Liona (Lawrence Berkeley National Laboratory (LBL)); GONSALVES, Anthony (Lawrence Berkeley National Laboratory); PICKSLEY, Alex (Lawrence Berkeley National Lab); TERZANI, Davide (Lawrence Berkeley National Laboratory); BENEDETTI, Carlo (LBNL); BARBER, Sam (LBNL); BERGER, Curtis (Lawrence Berkeley National Lab); VAN TILBORG, Jeroen (LBNL); SCHROEDER, Carl (Lawrence Berkeley National Laboratory); GEDDES, Cameron (LBNL); ESAREY, Eric (LBNL)

Presenter: FAN-CHIANG, Liona (Lawrence Berkeley National Laboratory (LBL))

Session Classification: Poster [Atrium]