



Contribution ID: 129

Type: talk

## Petawatt laser guiding and electron beam acceleration to 7.8 GeV in a laser-heated capillary discharge waveguide

*Tuesday, 17 September 2019 09:40 (30 minutes)*

In order to take advantage of the large acceleration gradients in laser plasma accelerators and achieve high beam energies, preformed plasma waveguides can be used to mitigate laser diffraction of focused laser pulses, which increases the acceleration length and the energy gain for a given laser power. Here we report on guiding of relativistically intense laser pulses with PW peak power over 15 diffraction lengths by increasing the focusing strength of a capillary discharge waveguide using laser inverse Bremsstrahlung heating. This allowed production of electron beams with quasi-monoenergetic peaks in energy up to 7.8 GeV [1], almost double what was previously demonstrated [2].

[1] A.J. Gonsalves et al. Phys. Rev. Lett. **122**, 08401 (2019)

[2] W. P. Leemans et al., Phys. Rev. Lett. **113**, 245002 (2014)

The work was supported by the Office of Science, US DOE under Contract DE-AC02-05CH11231, NSF, Ministry of Education, Youth and Sports of Czech Republic, High Field Initiative, together with European Regional Development Fund.

**Primary author:** GONSALVES, Anthony (LBNL)

**Co-authors:** SCHROEDER, Carl (Lawrence Berkeley National Laboratory); BENEDETTI, Carlo (LBNL); Mr PIERONEK, Christopher (LBNL); Dr TOTH, Csaba (LBNL); Dr ESAREY, Eric (LBNL); Ms LIONA, Fan-Chiang (LBNL); Dr CAMERON, Geddes (LBNL); Dr BAGDASAROV, Gennadiy (Keldysh Institute of Applied Mathematics RAS, Moscow); KORN, Georg (x); VAN TILBORG, Jeroen (LBNL); Dr BIN, Jianhui (Lawrence Berkeley National Laboratory); Dr DANIELS, Joost; Dr NAKAMURA, Kei (LBNL); Dr SWANSON, Kelly (LBNL); Dr BOBROVA, Nadia (Keldysh Institute of Applied Mathematics RAS, Moscow); Dr SASOROV, Pavel (Keldysh Institute of Applied Mathematics RAS); BULANOV, Stepan (Lawrence Berkeley National Laboratory); STEINKE, Sven (Lawrence Berkeley National Laboratory); Dr GASILOV, Vladimir (Keldysh Institute of Applied Mathematics RAS); LEEMANS, Wim (Lawrence Berkeley National Laboratory)

**Presenter:** GONSALVES, Anthony (LBNL)

**Session Classification:** Plenary Session 3

**Track Classification:** Invited Plenary Talk