

Abstract Submitted
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Progress towards BELLA Center's Laser-Plasma Accelerator based Free Electron Laser¹ FUMIKA ISONO, JEROEN VAN TILBORG, SAM BARBER, ANTON MATSSON, JOSEPH NATAL, CAMERON GEDDES, HAI-EN TSAI, TOBIAS OSTERMAYR, CARL SCHROEDER, WIM LEEMANS², ERIC ESAREY, Lawrence Berkeley National Laboratory, BELLA TEAM — Soft X-rays are a highly desired tool for novel experiments in the biological, chemical, and physical sciences. At the BELLA Center, we are pursuing the technology for a Laser-Plasma Accelerator (LPA) driven free-electron laser (FEL). A new dedicated 100TW-class laser system now delivers pulses of 2.5J and 40 fs duration (at 5 Hz repetition). After an upgrade with a deformable mirror, we are now routinely producing electron beams at the 100-200 MeV level. In this presentation we will describe our LPA FEL facility, including the advanced electron beam transport line to the 4-meter long strong-focusing VISA undulator. Transport and manipulation devices include a permanent quadrupole triplet, several steering magnets, an electro-magnetic triplet, a magnetic chicane to decompress the electron beam, a mid-line magnetic spectrometer, and a diagnostic chamber. Our simulations indicate that FEL gain should be observed by decompressing the few-femtosecond few-% energy spread beams with the chicane. The FEL diagnostics and recent results will be presented.

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