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UCLA Facility for Development and Testing of Novel Photoinjectors GERARD LAWLER, University of California, Los Angeles, MONIKA YADAV, University of Liverpool, ATSUSHI FUKASAWA, WALTER LYNN, NATHAN MAJERNIK, RIVER ROBLES, YUSUKE SAKAI, OLIVER WILLIAMS, VICTOR YU, JAMES ROSENZWEIG, University of California, Los Angeles — A new laboratory facility at UCLA is currently under construction by the Particle Beam Physics Laboratory with the purposes of developing and testing novel designs for advanced photoinjectors. The facility includes concrete bunker space with full access to laser systems for electron beam generation. Initial commissioning will be accomplished with testing of a novel S-band (2.856 GHz) photoinjector. It uses both standing and traveling wave radiofrequency (RF) acceleration removing many disadvantages of standing wave structures, e.g. harmful RF reflections, and includes many of the advantages of a traveling wave structure, e.g. bunch compression. The facility will also host the development, construction, and testing of a C-band (5.712 GHz) normal conducting cryogenic design. The joint UCLA-SLAC-LANL-INFN effort builds on previous work examining the performance of RF structures at cryogenic temperatures leading to increased accelerating gradients. Both designs are expected to increase electron beam brightness. In the case of the cryogenic gun, the 5-dimensional beam brightness is expected to be increased by over a factor of ten. Simulation shows this enables operation of an x-ray free electron laser producing an order of magnitude increase in photon energy.

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