

Photocathode drive laser upgrade for the Advanced Photon Source linac

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A Ytterbium-based photocathode gun drive laser is proposed for the Advanced Photon Source linac to replace the existing antiquated Nd:Glass laser. The proposed laser will readily operate at 30 Hz providing 0.3 mJ of 257-nm UV radiation per pulse yielding 1 nC from our copper cathode, s-band gun in support of user operations. In addition, the laser allows generation of lower-charge, low-emittance electron beams for high-brightness experiments in the APS Linac Extension Area. An advantage of updating the PC Gun drive-laser is that the configuration includes a downstream 3-m-long accelerating structure; this provides an additional 35-40 MeV of energy at the linac output over what is presently available from either of the two thermionic-cathode guns. Higher linac output energy will enhance stability for high-charge operation of the new storage-ring. We outline the laser physics requirements for our LCLS-I-style PC gun and summarize the expected beam performance.

Footnotes

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