

APR20-2020-000216

Abstract for an Invited Paper
for the APR20 Meeting of
the American Physical Society

Laser Applications in X-ray Free-Electron Lasers

SIQI LI, SLAC - Natl Accelerator Lab

Lasers have been a versatile tool in facilitating x-ray free-electron lasers in various components of the machine. At the beginning of photocathode injectors, the properties of the drive laser determine the initial distribution of the electrons. Laser heater has been widely used to modulate electron bunch energy spread in order to suppress collective instabilities arising from dispersive sections in the accelerator. Interaction between optical lasers and the electron beam can be used to manipulate the phase space of the electron bunch to produce desirable shapes in the x-ray emission. After the x-ray photons have been generated, optical lasers are used in synchronization with the x-ray pulse to study dynamics in atomic and molecular systems. Moreover, they can provide single-shot diagnosis of the x-ray pulse, such as laser streaking, to extract valuable information about the x-ray pulse itself and the dynamic system under analysis, which can be challenging to probe directly. In this talk I will discuss my research projects in laser applications in x-ray free-electron lasers.