APR09-2008-000023

Abstract for an Invited Paper
for the APR09 Meeting of
the American Physical Society

Next generation x-ray laser sources for the study of matter[1]

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Building on the coherence of radiation from bunched relativistic electrons, new x-ray free electron lasers (FELs) are poised to revolutionize the study of matter by enabling time-resolved experiments with femtosecond and possibly attosecond resolution and Angstrom scale spatial resolution. Spectacular results have already been obtained at the FLASH at DESY and new results are expected soon at the LCLS FEL at SLAC. Several other laboratories are also pursuing plans to construct novel FEL-based x-ray sources to take advantage of their extremely high peak and high average flux of photons. There are several types of FELs; all of them produce spatially coherent light and the more complex ones also produce temporally coherent light. Plans for new facilities often include an array of FELs with individual features targeting specific needs of experimentalists. The state of the art electron injector and linear accelerator will provide high brightness electron beams to such FEL array.

[1]Work supported by Department of Energy Contract No. DE-AC02-05CH11231.