MAR08-2007-006170

Abstract for an Invited Paper
for the MAR08 Meeting of
the American Physical Society

The proposed BigLight fourth-generation light source at the National High Magnetic Field Laboratory[1]

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"BigLight" is a compact fourth-generation light source planned for the National High Magnetic Field Laboratory's (NHMFL) quasistatic-field facility at Tallahassee. Designed by George Neil and his team at the Jefferson Laboratory, it is based on an RF superconducting accelerator system driving three free-electron lasers (FELs) that cover the wavelength range from 1 mm to 1.5 microns, plus a broadband THz source. BigLight's specification was derived in a series of five workshops covering potential applications in condensed matter physics, nanoscience, biophysics, chemistry, material processing, microscopy, astrophysics and other disciplines; participants included scientists from current FEL laboratories, potential users and international experts on light sources and high magnetic fields. Consequently, in addition to the robustness and user-friendliness demanded of a user facility, the source has several unique features, including the possibility of running the near- and mid-infrared FELs and the broadband THz source simultaneously; this will allow a wide variety of multi-color, time-resolved, pump-probe and pump-probe-probe experiments with an extremely small timing jitter between pulses. BigLight will also be able to produce either a continuous stream of micropulses ($\sim$1 ps time resolution) or flexible macropulse configurations. Co-location with the worlds highest quasistatic fields presents some unique experimental possibilities; potential users have proposed novel ultra-high-field time-resolved EPR measurements, dynamic nuclear polarization, nonlinear cyclotron resonance, interband magneto-optics, FTICR and many other techniques with very general applicability. In the talk, I will outline the scientific desiderata that have shaped the design of BigLight, and describe some of the proposed experiments.

[1]Supported by NSF IMR-MIP 0520481: Concept and Engineering Design of a Free Electron Laser Light Source for High Magnetic Field Research.