APR14-2014-020146

Abstract for an Invited Paper
for the APR14 Meeting of
the American Physical Society

LCLS – The Upgrade Path

UWE BERGMANN, SLAC National Accelerator Laboratory

With ultrashort and ultrabright X-ray pulses ($> 10^{12}$ photons in pulses of < 100 femtosecond length) X-ray Free electron lasers provide revolutionary new capabilities to study a wide range of phenomena including novel states of matter, quantum materials, ultrafast chemistry and structural biology. Starting operations in 2009 the Linac Coherent Light Source (LCLS) at SLAC has been the first of such machines delivering 280 eV - 11 keV X-ray pulses to users at a rate of 120 Hz. The success of the LCLS has positively impacted numerous efforts around the world and there are now five hard X-ray FELs in operation or under construction in addition to two FELs that operate in the VUV and soft X-ray region. The planned LCLS upgrade, LCLS-II, has recently been modified in order to address the recommendation of a report of the Basic Energy Science Advisory Committee from last summer. We will present examples of some of the most exciting LCLS science highlights, discuss operation upgrades and present the parameters of the new LCLS-II upgrade.