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LCLS, a 1.5 Angstrom Free Electron Laser: Opportunities and Challenges

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The dream of a laser operating at hard x-ray wavelengths is about to be realized. The Linac Coherent Light Source will be the world's first hard x-ray free electron laser reaching 1.5 Angstroms in the fundamental. The scientific opportunities span the breadth of science studied today with photons and extends the photon matter interactions into unchartered regimes with unprecedented fields at Angstrom wavelengths. Along with these opportunities come technical challenges. The background, performance and opportunities for the LCLS will be described. The technical challenges will be highlighted and the status of their solutions will be discussed. Finally, as with other accelerator based light sources even before the first saturated 1.5 Angstrom beam has been produced ideas for shorter pulses, higher energies and variable polarization are being discussed. These 'future' options will be highlighted.