

Testing the Compact Light Source: A Miniature Synchrotron for the Home Lab

Ronald D. Ruth, Jeffrey Rifkin, Roderick Loewen *Lyncean Technologies, Inc., Palo Alto, CA.* E-mail: Ronald_Ruth@lynceantech.com

During the past 30 years, synchrotron light sources have become the x-ray probe of choice for physicists, chemists, biologists and research physicians. With their high-quality, intense x-ray beams, these national research facilities have spawned a large number of new techniques and technologies spanning a broad array of applications. Perhaps the most dramatic examples of this impact come from the detailed 3-dimensional studies of protein structure using powerful crystallographic techniques such as multiple-wavelength anomalous dispersion (MAD). Recent research at Stanford University and Lyncean Technologies, Inc. has led to a new x-ray source, the Compact Light Source (CLS), which will significantly broaden this impact. The CLS is a tunable, homelab x-ray source with up to three beamlines that can be used like the x-ray beamlines at the synchrotrons--but it is about 200 times smaller than a synchrotron light source. The compact size is achieved by using a laser undulator and a miniature storage ring. The photon flux on a sample will be comparable to the flux of highly productive synchrotron beamlines. In this presentation I will introduce the Compact Light Source and show how it will bring the quality, tunability and flux of a synchrotron beam line into an x-ray scientist's local laboratory. At Lyncean Technologies, Inc. we are constructing a prototype of this source with SBIR funding from the NIGMS Protein Structure Initiative. I will report on our recent experiments and long-term outlook for the CLS.

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