

The Lyncean Compact Light Source: A Miniature Synchrotron for your Laboratory

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Synchrotron facilities around the globe are the supercomputers of X-ray science. There are more than fifty synchrotrons worldwide serving more than ten thousand researchers. The light emanating from these sources can be characterized as high flux, monochromatic, energy tunable and, in some cases, coherent. They provide a myriad of applications to thousands of researchers, but they come at a high cost requiring government support, and they are oversubscribed by an ever expanding user base.

Large synchrotrons provide the flux and energy tunability that is required for many experiments, such as diffraction for weakly scattering samples, spectroscopy, or dynamic tomography. The best available electron impact sources, such as liquid metal jets, fundamentally lack the characteristics required for many state-of-the-art X-ray measurements that are routinely used at synchrotrons.

The Lyncean Compact Light Source (CLS) is the first commercially developed X-ray source specifically created to deliver a true home laboratory alternative to many experiments done today at the large synchrotrons. X-rays are produced via inverse Compton scattering through the interaction of low energy electrons (25 to 45 MeV) in a miniature storage ring with a micrometer-period, high powered laser pulse (laser-undulator). Tunable, monochromatic, and high flux undulator synchrotron radiation is generated in the CLS "mini-synchrotron" due to the high repetition rate (~60MHz) of this interaction. Characteristics of the CLS X-ray beam are similar to those of a bending magnet synchrotron in terms of flux and coherence, and as such, similar applications can be performed: imaging/tomography, diffraction, scattering, and spectroscopy.

In this presentation we will present the technology behind the Compact Light Source as well as examples of the measurements that have been made and that can be made with the Lyncean Compact Light Source.

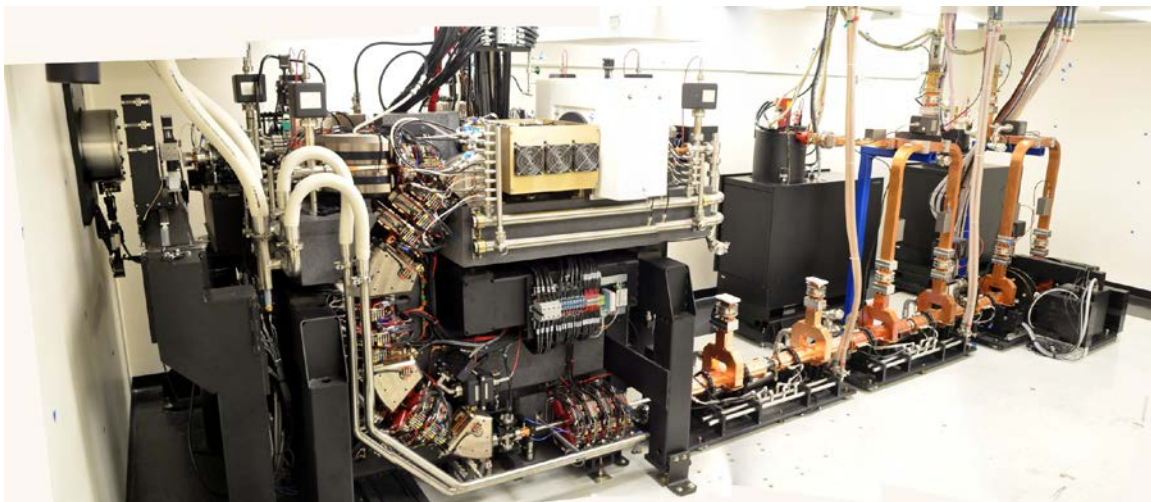


Figure 1. Photograph of the Lyncean Compact Light Source miniature synchrotron.