China develops world's brightest VUV free electron laser research facility

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A team of Chinese scientists announced on January 13 that they have developed a new bright vacuum ultraviolet FEL light source called the Dalian Coherent Light Source (DCLS), which can deliver the world's brightest FEL light in an energy range from eight to 24 eV.

Vacuum ultraviolet (VUV) light sources are especially useful for sensitive detection of atoms, molecules and clusters. They can also be used to probe valence electronic structures of all kinds of materials.

High-gain, free electron lasers (FEL) provide the brightest light sources from VUV to the X-ray region, levels that conventional laser technology cannot reach.

Recently, a series of high-gain FEL light source facilities in the X-ray and soft X-Ray region have been successfully developed around the world. The LINAC-based Coherent Light Source (LCLS) at the Stanford Linear Accelerator Center has given scientists hopes for new scientific discoveries in many frontier research areas. However, no dedicated high-gain VUV FEL light source facility for basic research has been developed in the world thus far. Led by Prof. YANG Xueming (Dalian Institute of Chemical Physics, DICP) and Profs. ZHAO Zhentang and WANG Dong (Shanghai Institute of Applied Source, SINAP), the team of scientists and engineers succeeded in developing the DCLS.

During the last two months, this team has successfully commissioned the new FEL facility operating in both HGHG and SASE. By applying

undulator tapering technology in the HGHG mode, a photon flux of 1.4 x 10^{14} photons per pulse was achieved. The project began in early 2012 and was a close collaboration between research scientists and engineers from DICP and SINAP (Home Institute of the Shanghai Light Source), two CAS institutes.

"VUV FEL light sources have wide applications in the study of basic energy science, chemistry, physics and atmospheric sciences. We expect that the new facility will lead to important scientific discoveries and international scientific collaborations," said YANG Xueming, a member of the CAS.

Provided by Chinese Academy of Sciences

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