European XFEL Project Shines a New Light for Research

October 11 2007, by Mary Anne Simpson

A colossal project called XFEL located in Germany will allow the collective sciences gain understanding of solar cells, fuel cells and watch how atoms and molecules combine.

The X-ray laser project XFEL holds new possibilities in experimental research. The XFEL project will enable researchers to film chemical reactions, map the atomic details of molecules, and capture the 3D images of the nanocosmos. The acronym XFEL stands for, "X-ray free-electron laser."

An easy description of what XFEL does is that it accelerates to a high energy status electrons and then makes the electrons emit high-intensity X-ray laser flashes.

The X-ray laser is a European endeavor with connections to DESY research center currently in the planning stages of construction. The DESY center in Hamburg, Germany is set for construction in early 2008 and is expected to be completed by 2013, according to a XFEL news release.

The plan involves a connection between the DESY plant in Hamburg-Bahrenfield to the city of Schenefeld. Most of the facility will be housed underground, but portions of the facilities may be observed above ground. The investment for the project construction will cost 986 million Euros. The XFEL project includes in all three sites. The DESY Bahrenfield, Osdorfer Born, and Schenefeld.

The XFEL accelerator tunnel will begin in DESY Bahrenfield. On this site the electrons will be prepared for acceleration. It will also be used to access shafts and halls which will be used in the construction and installation of the components required in the tunnels.

The main accelerator will end at Osdorfer Born, where the electron bunches will be separated and distributed to the various tunnels for generating light. The Schenefeld facility will be the place where the experiments with the X-ray laser. It will be home for over 350 scientists chosen for their interests and expertise in the area. The scientists will include members from Germany and the international community.

The range of applications for this technology include, improving scientific knowledge of the process taking place in fuel cells and solar cells. Scientists will also be able to watch how biomolecules at work observe the detail of how atoms and molecules combine to make materials.

The application of this science can be broadly applied to chemistry, biology, material science and physics. The possibilities for the XFEL technology being utilized in cross-disciplinary experimentation can only be imagined at this point. The unique feature of the XFEL X-ray laser is that the measured flash exposure time is a quadrillionth of a second. This infinitesimal exposure time ensures the photograph or image will not be blurred.