



Wednesday
March 13, 2013
4:00 pm
Room 1017
Dow Building

Dr. Mike Dunne

Lawrence Livermore National Laboratory

Laser Inertial Fusion Energy (LIFE)

The National Ignition Facility (NIF), the world's largest laser, recently completed construction and commissioning at the Lawrence Livermore National Laboratory (LLNL). Similar in scale to a major sports stadium, this \$3.5 billion facility has been designed to demonstrate fusion energy gain for the first time. This will mark the culmination of over 50 years of worldwide effort.

In this talk we will discuss an approach to generating gigawatt levels of electrical power from a laser-driven source of fusion neutrons based on NIF experiments. This approach is known as Laser Inertial Fusion Energy – or LIFE. Such a source is attractive because it will be inherently safe, generate no greenhouse gases or other emissions, provide security of fuel supply to all nations, use fuel that is sustainable effectively forever, be a continuous (baseload) electricity supply compatible with the existing grid, have no need for geological waste disposal, and will not require enrichment or reprocessing of nuclear material that could present a proliferation risk.

Laser fusion operates conceptually like a car engine. Fuel is injected into a chamber (solid, millimeter scale capsules of hydrogen isotopes). A piston (the laser) then compresses the fuel such that it ignites, producing copious energy (assuming NIF is successful). The system exhausts and the cycle repeats. With a repetition rate of 900 cycles per minute – similar to an idling car engine – the LIFE system is designed to produce over 1000 Megawatts of electricity onto the grid.

Fusion has been studied in the laboratory for many years. But the ability to create a net source of power has only recently been made possible – with the completion of NIF. This talk will describe the NIF facility, discuss the development path for a LIFE power plant, provide insights from the electric power industry, and discuss the potential roles of US universities.

About the Speaker: Dr. Mike Dunne joined LLNL in 2010 as Director for Laser Fusion Energy and LIFE. His role is to ensure full advantage is taken of NIF for potential electrical power generation. Previously, Dr. Dunne was the International Project Leader for the European laser fusion project 'HiPER'. He created a consortium of 26 institutions across 10 countries to develop one of the few Giga-Euro scale facility opportunities accepted onto the European roadmap of future research infrastructures (ESFRI), as well as onto the UK Large Facilities Roadmap. He was Director of the UK's Central Laser Facility for five years, based at the Rutherford Appleton Laboratory. Prior to this he spent 10 years at the UK Atomic Weapons Establishment, holding various strategic senior management roles, and has served as a visiting professor at Imperial College London, where he obtained his Ph.D. in Plasma Physics. Dr. Dunne has received a number of international awards and is the author of over 60 technical papers, over 50 invited talks, and numerous press and media reports.