

Institute of Physics

LONDON AND SOUTH EASTERN BRANCH REMS SECTION

Visit to HELEN Laser Facility at AWE, Aldermaston

Thursday 25th October 2007

This visit has been organised by Mike Wall

The HELEN laser has been operating at AWE for 28 years as the driver for high energy density physics research, generating matter in the plasma regime at temperatures exceeding 100eV and pressures over 1Gbar. In the current Comprehensive Test Ban Treaty, CTBT, era such laboratory experiments are essential to underwrite the performance of computer design codes.

The laser configuration has significantly changed over the years to respond to user requirements and to incorporate new technology as it develops. The laser uses neodymium glass laser technology. The current system configuration includes two synchronised laser beams. The 'long' pulse laser is split into two beamlines generating 0.5TW/beamline of second harmonic energy at 527nm in a 1ns pulse, focused on target in a vacuum chamber with f/3 lenses. The second laser uses the chirped pulse amplification technique to achieve over 100TW in a pulse width of 0.5ps. An off-axis parabolic reflector focuses this beam to irradiances exceeding 10^{19}W/cm^2 .

Project ORION is a project to construct a significantly larger laser to replace the HELEN laser. The project end is December 2010. The laser comprises ten nanosecond pulse beams producing 5TW at the 3rd harmonic, 351nm, and two synchronised Peta-Watt beamlines in 0.5 pico-second pulses. This configuration is designed to compress material through shocks driven by the long pulse beamlines, instantaneously heat by one of the short pulse beamlines and diagnose through radiography using the high energy x-rays generated by the other short pulse beamline.

The lasers are focused onto sub-mm scale targets that are made on-site. Target fabrication processes include micro-machining, laser machining, electro-plating, PVD coating, micro-assembly and characterisation including SEM, phase measuring interferometry and x-ray micro scanning tomography.

Agenda

10:30	Visitors arrive at Main Gate Reception for booking in and badging
11:00	Coffee on arrival in Conference Room – view AWE Safety Video
11:15	Presentations on HELEN Laser, Plasma Physics Research, ORION
12:15	Buffet Lunch in C16 Conference Room
13:15	Tour of facility including Laser Hall, Target Hall and Target fabrication
15:00	Depart

Host

T H Bett CPhys MinstP Group Leader for Operations in Plasma Physics Department with responsibility for managing HELEN operation, laser development and target production and development. Over 30 years at AWE with specialist background in high power glass lasers.

AWE operates as a GOCO, Government Owned, Contractor Operated organisation. AWE plc is the operating company co-owned by BNFL, Serco and Lockheed Martin. See awe.co.uk for further background. AWE is a corporate affiliate of the IOP.

Visitors must be UK nationals and provide the following information:-

National Insurance Number, Surname, Forenames, Nationality, whether dual nationality, Date

All visitors must bring two forms of ID with them, e.g. Passport, Driving Licence, Birth Certificate or Credit Card with picture.

Please indicate any special disability or dietary needs.

You are not allowed to bring photographic equipment, recording equipment, computer equipment, radio and telephone equipment, binoculars or similar devices, photocopiers, laser pens, explosive substances, firearms or offence weapons (including imitations), alcohol or unprescribed drugs.

The total number of people in the party is 20 and there is no charge for the visit or for coffee and lunch.

Getting there

By car. Either leave the M4 at junction 12, turn left onto the A4 and turn left onto the A340 to Aldermaston and Tadley or leave the M3 at junction 6 at Basingstoke and follow the signs for the A340 north and turn onto the A340. Both routes bring you onto the second map, which shows the way to the main gate.

By train. Get off at Reading and catch a 143 or 148 bus to Tadley or a taxi. The 148 bus leaves at 9:18 and arrives at the main gate at 9:51. The 143 bus leaves at 9:50 and gets to Tadley, New Road at 10:39. (I got these details from www.reading-buses.co.uk. I'm not taking any responsibility for the information being incorrect or for the buses not running!)

Google map of the area



AWE website map

