Orion: Target diagnostic

Electron Spectrometer – High Energy

The Orion laser facility at AWE Aldermaston, one of the largest scientific capital investments in the UK, houses a large neodymium glass laser system and a target chamber in which the high energy density physics experiments are performed. This is necessary to support certification of performance and safety of the UK deterrent.

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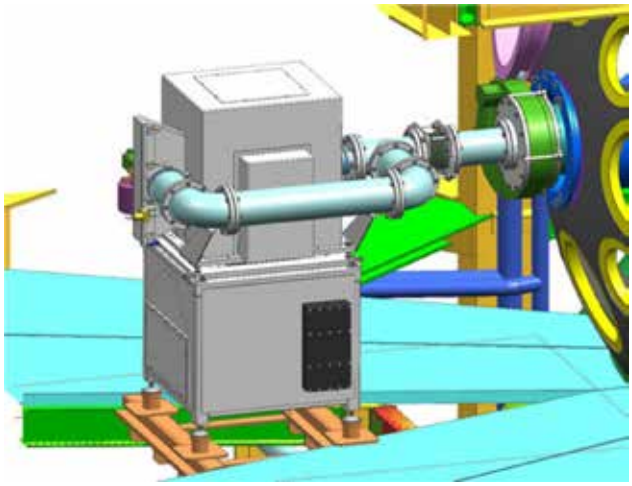
The Electron Spectrometer (GeV) is a diagnostic that can be located at two ports of the Orion target chamber. It is mounted on support frames located on the target chamber working platform. The Ten Inch Manipulator (TIM) is removed to accommodate the spectrometer but its feed-through assembly is retained on the target chamber to act as the interface and to provide the vacuum 'gate' valve.

The High Energy Electron Spectrometer consists of a large electromagnet, a vacuum vessel and an image plate. Electrons produced by the high intensity laser/plasma interactions are collimated and pass into the vacuum vessel, between the poles of the electromagnet. The electromagnet



Specification

Spectral range:	50 MeV to 1 GeV
Image plate:	Fuji MS
Scanner:	Fuji BAS-1800II
Magnetic field:	Up to 1.4T – 3.1T
Electrical supply:	150 V, 50 A
Weight:	>700 kg

deflects them in an arc that is a function of the electrons' accelerating potential. Electrons that reach the image plate on the rear face of the vacuum vessel form a signal on the lower half, the magnitude of which when measured by the plate scanner as a function of the number of electrons that arrived at that position. The upper portion of the plate, above the laser axis, records the background signal of X-rays from the interaction and any Bremsstrahlung radiation emitted by the electrons as they pass through material before the detector plane. This background signal is seen to be symmetrical, and is subtracted from the main signal on the lower image plate.

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