



Orion: Target diagnostic

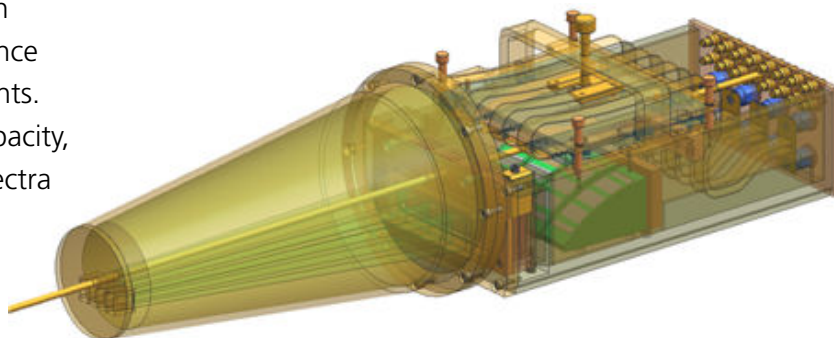
A photograph of the Orion laser facility building at AWE Aldermaston. The building is a large, modern structure with a curved, metallic facade and a large, dark, arched entrance. The image is overlaid with a semi-transparent teal and blue gradient.

High-Energy X-ray Spectrometer (HEX-ID)

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 High-Energy X-ray Spectrometer (HEX-ID) is a TIM based diagnostic that is fielded on both short-pulse and long-pulse laser shots and has a spectral range of 1 keV to 10keV. The diagnostic provides very high resolving power soft X-ray spectroscopy, soft X-ray fluxes originating from laser-plasmas and high temporal resolution measurements of X-ray emissions to enhance plasma diagnosis for Orion laser experiments. The diagnostic provides data on plasma opacity, detailed analysis of characteristic X-ray spectra from backlighter materials, identification of plasma ion species and absolute measurement of laser to X-ray conversion efficiencies.



Specification

TIM based

Resolving power: $E/\delta E \sim 800$

Spectral range: 1-10keV

Alignment laser: Class 2, 0.9mW, 655nm red laser

The diagnostic includes interchangeable detectors to allow spatially and/or temporally resolved measurements in the same laser shot. It is provided with shielding against electromagnetic pulse interferences generated in short-pulse laser-plasma environments and is designed around a convex reflection crystal system. There is a choice of three types of X-ray detector: image plate, complementary metal oxide semiconductor (CMOS) sensor or diamond photo-conductive detector (PCD) (in six modules). A filter stack is located next to entrance aperture to define spectral range and flux for each channel.

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