



Technical Background and Conceptual Design Report 2007

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1 Foreword

This document provides technical details of the High Power laser Energy Research facility, HiPER.

The content is the result of a 2-year design study by over 50 senior scientists from 12 of the 15 nations now associated with HiPER. The design is now sufficiently mature that a formal proposal has been made to the European Commission to prepare the case for construction as part of the European strategic facility roadmap process (ESFRI) and Framework Programme 7.

HiPER is a multi-national laser facility designed to allow Europe to take a leading position in the pursuit of Inertial Fusion Energy, whilst offering an internationally unique capability for science in extreme conditions. It will open up entirely new areas of research, providing access to physics regimes which cannot be explored on any other science facility. It has been formally endorsed by 7 European nations at the governmental or national funding agency level, 2 regional governments, over 20 scientific institutions and has direct involvement from industry.

Inertial Fusion Energy (IFE) lies at the heart of the design of HiPER. Fusion is the holy grail of energy sources – combining abundant fuel with no greenhouse gas emissions, minimal waste products, and a scale that can meet mankind's long-term energy demands. Fusion combines hydrogen isotopes to create helium gas and a neutron which is captured to provide heat for a steam turbine. The IFE solution for fusion is a proven scientific concept. A laboratory demonstration of net energy production using lasers for IFE is now only 3 to 5 years away, marking the culmination of 40 years research. This will attract significant public and political attention, and so the HiPER project has been developed to provide a clear path forwards, based on a strong science mission.

The project already stretches beyond the EU, involving coordination with work in Japan, China, South Korea, Canada, Russia and the USA.

HiPER represents science with a strong societal goal.



Professor Mike Dunne, Coordinator of the HiPER project
June 2007

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