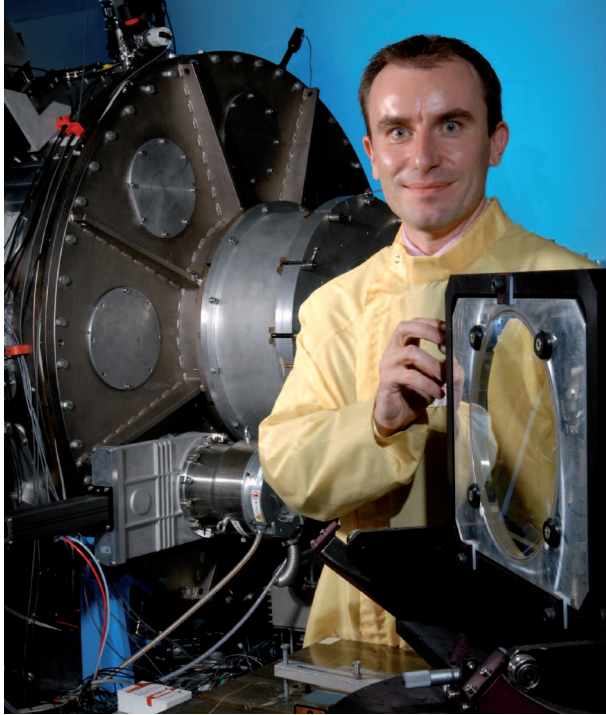


## Foreword

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This annual report for the Central Laser Facility (CLF) at the CCLRC Rutherford Appleton Laboratory is an account of the scientific research which has been carried out by users of the Facility and its staff over the financial year 2005-06.

The research of the CLF covers a wide range of disciplines across physics, chemistry and biology as well as the development of the facilities themselves and the associated instrumentation. The laser systems involved span a wide range of characteristics and include short pulse high repetition rate systems with wide tuning range to ultra-high power lasers which are capable of producing extremely high intensities and are used for fundamental studies and applications in plasma physics.

This is an exciting time for the CLF. As the new Director I am proud to lead a fully operational facility with 4 major development projects underway, along with a number of laboratory scale enhancements to existing areas. We are now less than one year away from operation of Astra-Gemini, which will provide 30J in 30fs (1 Petawatt power) up to 3 times per minute, split between 2 beams into a new interaction bunker. We are mid-way through the development of Ultra, which will be the world's most sensitive time-resolved vibrational spectrometer. We are just starting the transformation of Astra Target Area 1 into a highly versatile facility offering sub-10fs beamlines from the XUV to IR in conjunction with endstation technology developed collaboratively with Diamond. Most recently, we are embarking on a major upgrade to Vulcan which promises to offer 10 Petawatt capability if the technical developments over the coming year prove favourable.

The high level of demand for access to the CLF both from UK and international scientists continues greatly to exceed the time available for the scheduling of experiments. The standard of the research presented in this report is first rate, demonstrating once again the internationally leading position of the CLF and its user community.

Looking to the future, I foresee far closer ties with our international partners in many areas of laser development and applications, and wholly new opportunities in the combination of laser and accelerator technology. We will be actively driving forward these areas over the next year.

I would like to end with a word of thanks to the CLF staff for their outstanding effort, enthusiasm and commitment over the past year.