# Delivery of a 100J DiPOLE laser to the HiLASE project: Progress update

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## Introduction

CALTA, the Centre for Advanced Laser Technology and Applications, has been awarded a contract to supply a 100J, 10 Hz version of the successful DiPOLE laser design to the HiLASE project in the Czech Republic. HiLASE is funded by the Czech Ministry of Education, Youth and Sports and the European Commission with the aim of developing diode pumped solid state laser technology for applications in research and industry.

## Design Overview

The 100J DiPOLE laser consists of 3 main sections: the front end, a 10J amplifier and 100J amplifier.

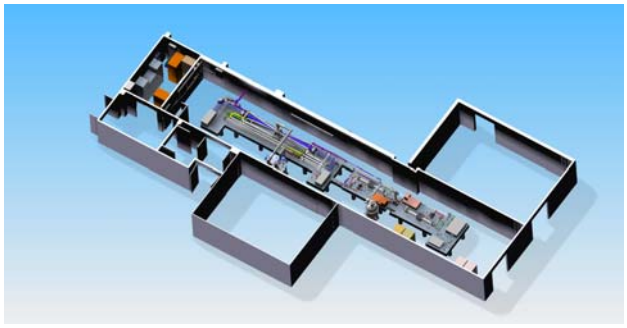

*Figure 1: Schematic of 100J, 10Hz DiPOLE laser for HiLASE*

The front end includes 3 amplification stages starting with a fibre oscillator which produces pulses at ~nJ. The first (regenerative) pre-amplifier increases the energy to a few mJ, before the second pre-amplifier outputs pulses at the 100mJ level. The front end has the capability to provide shaped pulses.

The 10J amplifier contains the ceramic Yb;YAG gain media and is a 7 pass system. The 100J amplifier is a 4 pass system.

## Project overview

The CLF project to supply a 100J, 10Hz DiPOLE laser to the HiLASE project began in February 2013 and involves a team of upwards of 30 people. The project schedule is divided into several stages: design, procurement, installation, commissioning, decommissioning and delivery. The laser will be built and commissioned at Rutherford before being transported to the Czech Republic.

## Recent Progress

The procurement phase of the project is an extensive and ongoing phase with the longest leadtime components including the gain media, the diode drivers and the cooling systems, each taking 15months+ to deliver to the project.

With refurbishment of the new DiPOLE laboratory, the installation phase could commence in Summer 2014.

Installation of the front end was completed in September 2014 and commissioning is currently ongoing (December 2014).

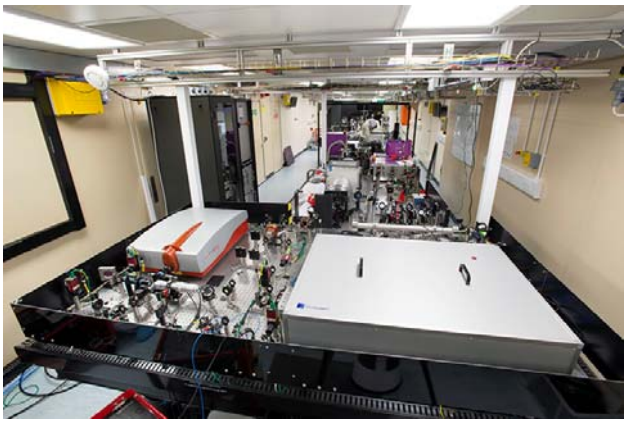

*Figure 2: photo of the front end*

The 10J amplifier section is progressing well with the metalwork of the amplifier head and the gain media delivered. The 10J diode driver has been installed. The 10J cooling system is due to be installed early 2015. Installation of beam path optics including vacuum spatial filters, and the diagnostics are proceeding in parallel.

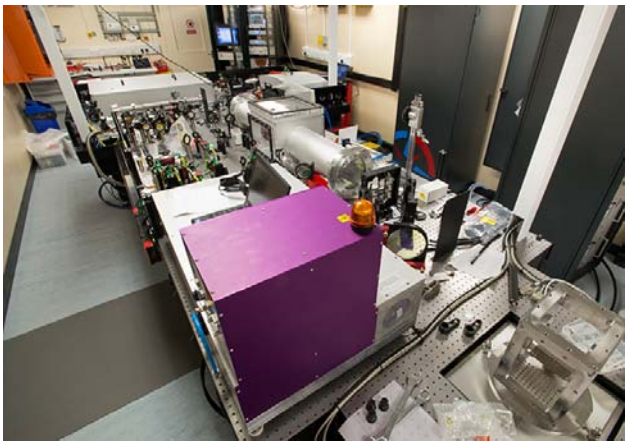

*Figure 3: Image of the 10J diode driver (foreground), vacuum spatial filter and amplifier head*

The first slabs of the ceramic Yb;YAG gain media for the 100J amplifier have been delivered and the 100J diode drivers and

cooling system are due to be installed and commissioned early 2015. The control system is based on EPICS (Experimental Physics and Industrial Control System) and is being tested in parallel.

## Conclusion

This has been a very busy and productive year for the project with great strides made. The coming year will see the completion of the installation of the 10J sub-system elements (e.g. cooling system) and installation of the 100J sub-system before commissioning the full laser system.


## Acknowledgements

Thanks and huge recognition to the CLF and HiLASE project teams for their dedication and industry over the past year.