



Contribution ID: 164

Type: talk

Measurement of Compressor Distortions on a TW Class Laser System.

Thursday, 19 September 2019 16:40 (20 minutes)

One of the main challenges for the development of 10 Hz petawatt-class lasers is the avoidance of grating heating in the compressor [1,2]. Beam distortions appear even at low average power [3], meaning mitigation strategies must be adopted for smaller scale systems. In this paper we describe detailed measurements of the compressor parameters in TA2 of the Gemini laser at the Central Laser Facility (CLF), delivering 500 mJ, 40 fs pulses in a 60 mm diameter beam. Traditionally, this has been a shot-on-demand area but driven by the demand for higher repetition rate to develop plasma accelerators, we are investigating the performance of the facility operating at 5 Hz.

We have found that at low energy density on the gratings ($\sim 20 \text{ mJ cm}^{-2}$) a significant degradation is observed in the focal spot quality. Elongation in the focal spot and a lengthening of the compressed pulse duration indicate a degree of spatio-temporal coupling rather than heat-induced aberration. We will discuss the implications of these results and how they will affect future CLF high power laser developments.

[1] Leroux *et al.*, Opt. Express **26**, (2018).

[2] Alessi *et al.*, Opt. Express **24**, (2016).

[3] Fourmaux *et al.*, Opt. Express **17**, (2009).

Primary author: THORNTON, Christopher (STFC)

Co-authors: BOURGEOIS, Nicolas (University of Oxford); Dr DANN, Stephen (Lancaster University); SYMES, Daniel (Rutherford Appleton Laboratory); Mr SUGUMAR, Ravi (Indian Institute of Technology Madras, Adyar, Chennai, India - 600036.); Dr KRISHNAN, Sivarama (Indian Institute of Technology Madras, Adyar, Chennai, India - 600036); Mr SAHOO, Anubhab (Indian Institute of Technology Madras, Adyar, Chennai, India - 600036)

Presenter: THORNTON, Christopher (STFC)

Session Classification: WG7

Track Classification: WG7 - High brightness power sources: from Laser Technology to beam drivers