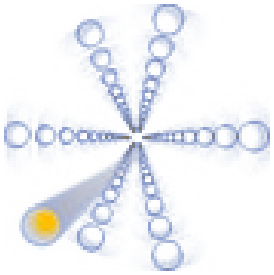

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Innovative Technique for the Characterization of Ultra-Short Laser Pulses

Thursday, 9 October 2014 15:45 (15 minutes)

The characterization of the ultra-short high power laser pulses has always been a challenge.
It requires using the same pulse to measure itself because do not exist an event shorter to compare to.
In addition to that, there are also many other difficulties both for the pulse itself (no-linear effects, distortion, etc.) and for the complexity of the set up (alignment, devices, etc.) necessary to perform measurements.
One of the most promising techniques about characterization is GRENOUILLE [1], that simplifies the set up compared to other popular full intensity-phase measurement technique like FROG, SPIDER and others.
This new technique has many advantages: it is considerably more sensitive, extremely simple to set up and align.
It provides us a trace that yields the full pulse intensity and phase, a spectrogram, that involve temporal and frequency resolution simultaneously.
In this poster we present the development of the analysis software for the data acquired by a GRENOUILLE.
This innovative diagnostic program is based on the acquisition of this measurement in the form of experimental image, which will be cleaned up (subtraction of the background) and calibrated before being used in the program so it can be compared to the calculated analytic image.
Starting from an arbitrary pulse, we create a simulated image and we compared it to the experimental data.
By using a minimisation algorithm changing the arbitrary pulse, we minimise the distance between the two images, obtaining the laser pulse shape.
The software will be tested on experimental images acquired in the Front-End at low-power and in the Target Area Petawatt, at full power, at the Vulcan Facility at RAL.

1. P. O'Shea, M. Kimmel, X. Gu, and R. Trebino, Opt. Lett., vol. 26, p 932 (2001).

Primary author: Mr GALLETTI, Mario (Univeristà di Pisa)

Co-authors: Dr GIULIETTI, Danilo (Università di Pisa); Dr GALIMBERTI, Marco (Science and Technology Facilities Council)

Presenters: Dr GALIMBERTI, Marco (Science and Technology Facilities Council); Mr GALLETTI, Mario (Univeristà di Pisa)

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