Technology Offer

Sensor for the Carrier-envelope Phase of Short Laser Pulses: A Measuring Device and a Laser Control Device

Ref.-No.: 1202-4253-WT

We present a sensor for the carrier-envelope phase of a few-cycle femtosecond laser. The sensor uses the electron current emitted from a nanoscale metal tip onto which we focus high-repetition-rate laser pulses.
Possible applications of this sensor are in the field of the technique of controlling and using pulse lasers, in particular used for measuring or high-power irradiation purposes.
The size of such a simple stand-alone sensor device for the carrier-envelope phase could be in the order of a few cm3. Such a sensor combines a higher sensitivity with 10 times smaller cost and 10 times smaller size than conventional f-to-2f interferometers.

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A conventional approach for stabilizing the CE phase is based on correlation techniques using an interferometric superposition of successive pulses in a so-called f-to-2f interferometer. The correlation technique may have disadvantages in terms of complexity of the experimental setup with many expensive components and complexity of the interferometric superposition in practical applications as well as with regard to the required laser power.

The method offered here is based on a photoemission measurement with improved sensitivity, improved reproducibility, reduced requirements with regard to laser pulse power and/or reduced complexity of the detector setup.

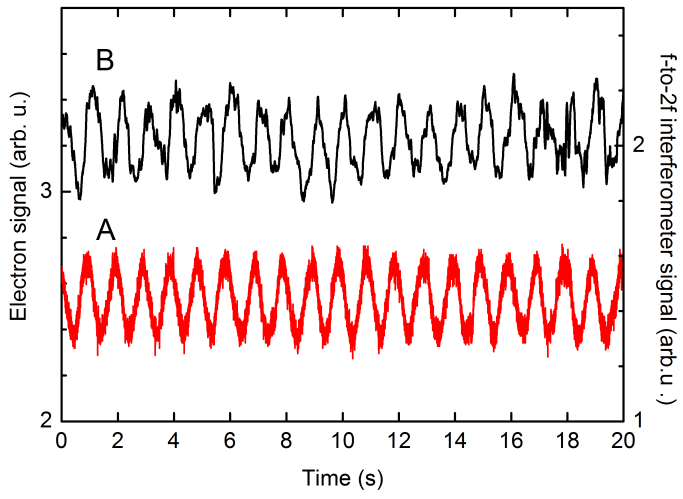

Fig. 1: A comparison of experimental results obtained with photoemission sensor (black curve B) and a conventional f-2f-interferometer (red curve A), resp.

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The comparison of both measurements shows that the photoemission signal is varied with the same frequency (here: f_{CEO} = 1 Hz) like the correlation signal obtained with the f-2f-interferometer.

Patent Information

PCT-Application

Literature

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