Sampling Light Fields in Ambient Air

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The ability to follow the temporal evolution of a light field on a time scale significantly shorter than its oscillation period lies at the heart of many ultrafast science applications, including attosecond spectroscopy and the development of future petahertz electronics. The rapid progress in laser technology and the ever-growing number of ultrafast laser laboratories around the world have created a need for cost-effective and user-friendly pulse characterization techniques. At the same time, these new techniques should be versatile enough to keep pace with the high demands of state-of-the-art laser sources operating at high-repetition rates and in various spectral ranges. We will discuss a novel approach based on the generation of light-induced transient currents in air plasma, which allows an alternative user-friendly implementation of both single-shot carrier-envelope-phase measurements [1,2] and femtosecond streaking [3]. In contrast to the widely used stereo-ATI phase meter or the traditional attosecond streaking method, which require rather complex high vacuum setups, the new approach is easy to implement and works in ambient air.

References

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