

IRTG-Seminar



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“Phase-modulated harmonic light spectroscopy”

Coherent time-resolved spectroscopy is a powerful tool to study ultrafast dynamics in complex systems [1,2]. It is highly desirable to extend these techniques to the XUV spectral range [3]. However, demands on phase stability increase significantly when going to short wavelengths and advanced pulse manipulation in the XUV is challenging. We suggest an approach based on acousto-optical phase modulation of the driving/seed laser combined with harmonic lock-in detection [4]. In this approach, demands on phase stability are drastically reduced and signals are efficiently isolated and amplified. We demonstrate this concept in a proof-of-principle study with second harmonic generation. The concept is characterized in a femtosecond pump-probe experiment measuring electronic wave packet dynamics in atomic systems. Our results show promise for an implementation in high harmonic generation (HHG) and high-gain harmonic-generation (HG) light sources.

References:

- [1] S. Mukamel, Principles of Nonlinear Optical Spectroscopy (Oxford University Press, 1995).
- [2] M. Cho, Chem. Rev. 108, 1331 (2008).
- [3] S. Mukamel, D. Healion, Y. Zhang, and J.D. Biggs, Annu. Rev. Phys. Chem. 64, 101 (2013).
- [4] L. Bruder, U. Bangert, and F. Stienkemeier, Opt. Express 25, 5302 (2017).

**Tuesday, June 20, 2017, 6:00 p.m., HS II,
Physics high rise, Hermann-Herder-Str. 3**