

Seminar

High-harmonic generation in strongly correlated materials

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High harmonic generation (HHG) in atomic and molecular gases is the basis of attosecond science and has been studied for decades [1]. More recently, HHG has also been demonstrated in semi-conductors [2] and liquids [3]. In this talk, I will explore the possibility of HHG in strongly correlated systems such as Mott insulators and quantum spin models. Using dynamical mean field theory we simulate the current induced by periodic electric fields and extract the HHG spectrum [4]. It turns out that the main features of this spectrum can be explained by simple quasi-local processes such as doublon-holon recombination from nearest or next-nearest neighbor sites. In the quantum spin case we use the infinite time-evolving block decimation method to study the HHG produced by time-periodic magnetic fields. Here, the main features of the HHG spectrum can be related to the magnon spectrum.

[1] P. B. Corkum, Phys. Rev. Lett. 71, 1994 (1993)

[2] S. Ghimire et al., Nature Physics 7, 138 (2010)

[3] T. T. Luu et al., Nature Comm. 9, 3723 (2018)

[4] Y. Murakami, M. Eckstein, and P. Werner, PRL 121, 057405 (2018)

[5] S. Takayoshi, Y. Murakami, and P. Werner, PRB in press (2019)