



Wednesday, March 27, 2019 – 14:00 h  
CFEL Seminar room V (Bldg. 99)

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## Ab-initio description for propagation of extreme light pulse in solids: recent progresses

When we theoretically investigate interaction of an intense and ultrashort laser pulse with solids, there are two aspects that should be considered: the strong electric field of the light pulse induces nonlinear electron dynamics in solids, and the nonlinear polarization that arises from the electron dynamics affects the propagation of the light pulse. To describe the propagation of the intense light pulse, it is necessary to calculate simultaneously the propagation of the light electromagnetic fields and the electron dynamics. We have developed such scheme based on ab-initio time-dependent density functional theory [1], and have applied the method to various problems. In my talk, I would like to show several recent progresses of our approach: (1) oblique irradiation of a strong laser pulse on thin dielectric film, (2) pump-probe calculation for the generation of coherent optical phonon and amplification of the impulsively stimulated Raman scattering wave [2], and (3) a unified description for interaction of intense light pulse with thin materials, from mono-atomic layer to thick films [3].

[1] K. Yabana et.al, Phys. Rev. B85, 045134 (2012).

[2] A. Yamada et.al, arXiv:1810.06168.

[3] S. Yamada et.al, Phys. Rev. B98, 245147 (2018).

