H Atom Scattering Meets Ultrafast Laser Heating: Obstacles, Results and Simulations

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Using spatially chirped high energy femtosecond UV laser pulses for photolysis of hydrogen iodide we generate intense H atom pulses [1] with a measurable pulse duration of down to 1.5 ns. Since the intensity of the H atom pulses is sufficient, we have performed angle- and velocity-resolved H atom scattering experiments on highly oriented pyrolytic graphite (HOPG).

Similarities to the previously conducted experiments on graphene on Ir(111) were observed. Differences can primarily be attributed to the structural differences of the surfaces. Since the obtained signal is well reproducible and the signal of the scattered H atoms is clearly distinguishable from the background signal, the next step towards time-resolved scattering experiments was taken: the simultaneous heating of the surface with a 25 ps, 532 nm laser pulse. I will present first results, experimental challenges encountered along the way, and a possible interpretation of the data.

[1] K. Golibrzuch, V. Walpole, A. Schönemann, and A. M. Wodtke, *J. Phys. Chem. A* 2022, *126* (43), 8101-8110.