



4th year colloquium

# Shining light on Lead-Halide Perovskites: what optics can tell about the inner workings of the Solar-Cell-champion material

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Lead halide perovskite are remarkable in many respects. Even samples with relatively unassuming quality were demonstrated to exhibit some of the most fundamental phenomena in semiconductor physics, such as laser cooling and room-temperature quantum coherence in the form of super-radiance. Perovskites are also known for their “resilience” against formation of deep defects that can act as charge traps, making them excellent materials for photo-voltaic applications: perovskite-based solar cells have recently nearly reached the levels of the state-of-the-art conventional Si- based devices in terms of efficiency. Amongst these achievements, perhaps the most puzzling fact is that there is still no clear understanding as to what is underlying this remarkable performance in the microscopic level. In this presentation I will discuss how much can one learn about the basic properties of perovskites by means of optics. I will show how classic measurements on the paradigmatic perovskite  $\text{CH}_3\text{NH}_3\text{PbBr}_3$  in a broad wavelength range, reveal that in order to account for the experiment even on the qualitative level, one needs to amend the usual minimal coupling scheme and to introduce an atomic-level coupling between electric field and the spin degree of freedom (!). As it turns out this term has far-reaching consequences for the low-energy properties of perovskites and can account for many of puzzling aspects of perovskite phenomenology, as well as predict unexpected novel physics in this class of materials.

**Monday, June 26, 2023 11:30am - 12:30pm**

Raiffeisen Lecture Hall



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.

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