WWU MÜNSTER

FACHBEREICH PHYSIK

# Allgemeines Physikalisches Kolloquium

**Donnerstag, 19.01.2023 um 16 Uhr c.t.**


## Prof. Paulina Plochocka

CNRS, Toulouse


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### Metal Halide Perovskite—Exciting Playground for exciton and polaron studies


High environmental stability and surprisingly high efficiency of solar cells based on 2D perovskites have renewed interest in these materials. These natural quantum wells consist of planes of metal-halide octahedra, separated by organic spacers. The unique synergy of soft lattice and opto-electronic properties are often invoked to explain superior characteristic of perovskites materials in applications. At the same time such unique synergy creates fascinating playground for exciton physics which challenges our understanding of this elementary excitation. I will demonstrate that even after decade of intense investigation the notation" unique" so often used in case of perovskites deserves serious scrutiny.
First, I will show that in 2D perovskites, the distortion imposed by the organic spacers governs the effective mass of the carriers. As a result, and unlike in any other semiconductor, the effective mass of the carriers in 2D perovskites can be easily tailored. Secondly, I will highlight controversy related to exciton fine structure in different perovskite compounds and demonstrate that the soft lattice can suppress relaxation of excitons to dark state making 2D perovskites great light emitters.