THE PHYSICS COLLOQUIUM

Thursday 23 April 2026, 4:00 p.m.
Nijenborgh 4, Lecture Hall **5111.0080**

Collective Properties of Perovskite Nanomaterials

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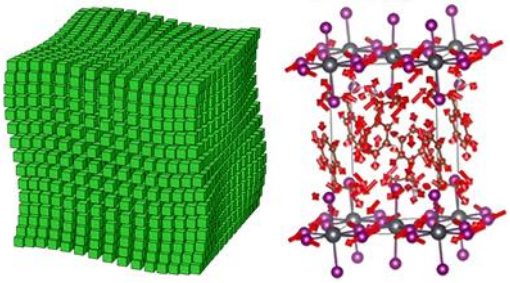
Metal halide perovskite nanocrystals and two-dimensional perovskites have emerged as versatile semiconductors with outstanding optical properties and structural tunability. These materials are especially interesting because they form multicomponent systems in which interactions between nanocrystals, organic spacers, inorganic lattices, excitons, and phonons can give rise to collective properties. Such properties arise from coupling, correlation, and dynamic organization across multiple scales.[1] Studying these phenomena is exciting and challenging, because it requires tracking of structural, vibrational, and electronic interactions in heterogeneous materials where chemistry and mesoscale order are connected.



Here, I will discuss two examples of perovskite nanomaterials whose behavior may be considered emergent. First, in self-assembled CsPbBr3 nanocrystal superlattices, correlated positional disorder propagates across the assembly and produces anisotropic structural signatures, showing how surface chemistry influences mesoscale order.[2] Second, in chiral two-dimensional hybrid perovskite R-MBA2PbI4, structural dynamics couple the organic and inorganic components and provide a route for chirality transfer.[3] Together, these examples show that perovskites offer a rich platform for exploring emergent phenomena that may find use in optoelectronic and photonic applications.[4]

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[1] Bassani et al., ACS Nano 18, 14791-14840 (2024).
[2] Filippi et al., ACS Nano 20, 3867-3877 (2026).
[3] Ramesh et al., arXiv 2507.10036v2 (2025).
[4] Baranov, ChemistryEurope 4, e202500493 (2026).

Join us for coffee starting 3:30 p.m. Refreshments will be served after the lecture.
For more information contact the hosts: Antonia Grubisic-Cabo (a.grubisic-cabo@rug.nl))
Website: http://www.rug.nl/research/vsi/colloquia/