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Low dimensional perovskites: from chemical design to photonic applications

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Introduction, prof. **Javier Marti Rujas** (Politecnico di Milano, DCMIC)

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live | online

link will be emailed to
registered participants

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Metal halide perovskites are attracting increasing interest for applications in photonics, light emitting devices and lasers. However, the need to overcome trapmediated non-radiative losses, increase the radiative recombination efficiency, improve the material stability, and find non-toxic alternatives to lead-based materials urgently call for the study of different perovskite structures. 2D perovskites are promising alternatives to improve the luminescence efficiency, grant increased environmental stability, block ionic diffusion, and relax geometrical constraints giving access to a wider range of lead-free compositions.

In this presentation, I will discuss how their exceptional chemical versatility allows to tune their optoelectronic properties on demand by modulating the chemical composition, structural properties, and quantum and dielectric confinement in structures with different dimensionalities. The use of optoelectronically active templating cations as well as of inorganic dopants further push the boundaries to create functional perovskites with unprecedented luminescence efficiency and tunability. Finally, I will discuss how the choice of the templating cation critically affects the structural rigidity, defectivity, photostability and morphology of the perovskite film determining its ability to sustain amplified spontaneous emission, thus providing fundamental synthetic guidelines to improve the coherent emission properties, and opening the way to the design and exploitation of a new class of two-dimensional perovskite lasers.