Exciton-Polaritons in microcavities loaded with atomically thin crystals

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Monolayer transition metal dichalcogenides (TMDC) have emerged as a new platform for studies of tightly bound excitons and many-body excitations in ultimately thin materials. Their giant dipole coupling to optical fields makes them very appealing for implementing novel photonic devices, and for fundamental investigations in the framework of cavity quantum electrodynamics [1].

In the colloquium, I will discuss the formation of exciton-polaritons in the regime of strong light-matter coupling between TMDC excitons and microcavity photons, and focus specifically on effects linked to the emergence of coherence and of bosonic condensation. This involves the discussion of long-range order \( g^{(1)}(r) \), but also second order correlations \( g^{(2)}(t) \) in the light-field emitted from the cavity. [2,3]. I will also demonstrate, that the strong coupling regime, by itself, can serve as a an interesting tool for opening emission pathways in dark materials via polaritonic material engineering [4]