# Coupling of 2D semi-conductors and narrow linewidth quantum emitters

**Antoine Reserbat-Plantey**[1]
Carlotta Ciancico[1], Kevin Schädler[1], Sofia Pazzagli[2], Pietro Lombardi[2], Costanza Toninelli[2], Adrian Bachtold[1], Frank Koppens[1]

*[1] ICFO - Institut de Ciencies Fotoniques, Mediterranean Technology Park, Av. Carl Friedrich Gauss, 3, E-08860 Castelldefels, Barcelona, Spain*
*[2] LENS - European Laboratory for Non-Linear Spectroscopy, Università di Firenze, Via Nello Carrara 1, I-50019 Sesto Fiorentino, Florence, Italy*

antoine.reserbat-plantey@icfo.eu

Near-field interactions between a quantum emitter and a planar surface exhibit rich physics and set the basis for integrated quantum photonics technologies [1]. With the rise of graphene and other 2D solids, new hybrid devices comprising monolayer of graphene and fluorescent emitters, have revealed tunable and unusual non-radiative energy transfer physics between the emitters and the 2D solid [2-4]. Such dissipative coupling has even been used to detect the motion of a graphene nanomechanical resonator suspended over an emitter [5].
Dispersive coupling schemes are required, however, to maintain phase coherence, but has not been reported so far. Here we use transition metal dichalcogenide (TMD) monolayer coupled to a molecule of DBT, an extremely narrow linewidth (100MHz) quantum emitter, to manipulate the emission properties of this molecule (energy and emission rate). We also study experimentally various configurations, where the molecules are deposited on top or below the monolayer, as well as the situation where the molecule is located below a suspended membrane of $MoS_2$, a system particularly appealing for hybrid optomechanics. This original approach, combining excellent optical properties of TMD together with state-of-the-art molecular single photon sources, holds a great potential for nanophotonics [6], quantum computing and single-photon optomechanics.

## References

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## Figures

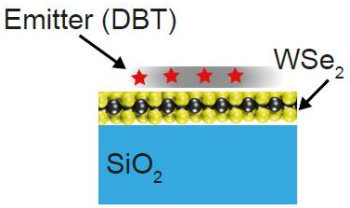


**Figure 1:** Sketch of a typical hybrid device where narrow linewidth emitter (DBT molecule) are deposited on top of a $WSe_2$ monolayer.

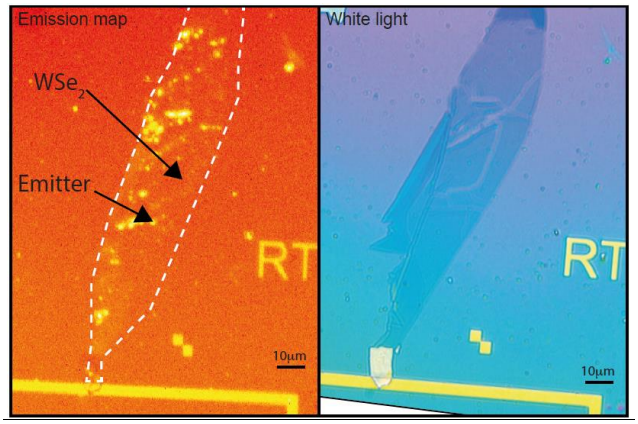


**Figure 2:** Emission (centre) and white light (right) images at low temperature show local quantum emitters deposited on top of 2D semi-conductor.