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Physics and chemistry in 2D materials: From 2D superconductors and magnets to hybrid molecular/2D heterostructures

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Superconductivity and ferromagnetism are two cooperative properties difficult to reach in the 2D limit. The discovery of graphene and other 2D materials has opened the possibility to check these phenomena in this limit. Here we show that, contrarily to the expectation, superconductivity of TaS₂ can be enhanced in the 2D limit [1]. As far as the 2D magnetic materials are concerned, we show that both solid state and coordination chemistries can provide examples of layered materials that can be exfoliated to afford 2D magnetic materials [2]. We also report the attempts we are making to measure the magnetism of these atomically-thin layers. Finally, we report some examples of hybrid heterostructures prepared by mixing functional molecules with 2D materials [3].

References

- [1] E. Navarro-Moratalla et al., *Nature Comm.* 2016, **7**, article number: 11043.
- [2] A. Abherve et al., *Chem. Sci.*, 2015, **6**, 4665.
- [3] J. Dugay et al., *Nano Lett.* 2017, **17**, 186.

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