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# PSI Condensed Matter Colloquium

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https://psich.zoom.us/j/96364562053

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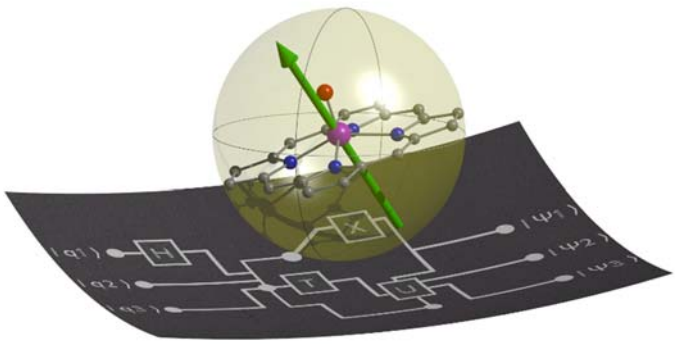
## Magnetic Molecules and the Second Quantum Revolution: Opportunities and Challenges

Implementation of modern Quantum Technologies might benefit from the remarkable quantum properties shown by molecular spin systems.[1] The versatility of the molecular approach combined with rational design has recently boosted the operativity temperature of molecules acting as bit of memory, otherwise known as Single-Molecule Magnets, or the coherence time of molecular spin qubits. However, the molecular approach also poses key challenges, requiring for instance to overcome limitations such as those induced by low energy vibrational modes typical of molecular lattices.[2] This drawback can be in part overcome by chemical design.[3]

Molecules can also be processed to be deposited on surfaces, allowing the realization of hybrid nanostructures. Combining molecules with superconductors has allowed observing a tuneable interaction of the molecular spin with the Cooper pairs of an underlying superconducting thin film.[4] At the same time, the condensate state of the superconducting substrate can be used to switch a SMM into the quantum tunneling regime.[5] An overview of our recent results will be provided.



Contact: Jan Dreiser (Tel. 58 95)

**References**

[1] M. Atzori, R. Sessoli, *J. Am. Chem. Soc.* **2019**, *141*, 11339-11352.

[2] E. Garlatti, L. Tesi, *Nat. Commun.* **2020,** *11*, 1751.

[3] L. DeCamargo, et al. *Angew. Chem. Int. Ed.* **2020** , available on line https://doi.org/10.1002/ange.202009634

[4] L. Malavolti, et al. *Nano Lett.* **2018**, *18*, 7955-7961.

[5] G. Serrano, et al. *Nat. Mater.*. **2020,** *19*, 546–551.