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Coupling molecular spin centers to microwave resonators: steps towards the implementation of molecular qubits for hybrid quantum circuits CLAUDIO BONIZZONI, Univ of Modena Reggio Emilia, ALBERTO GHIRRI, Istituto Nanoscienze CNR Nano S3 Modena, MARCO AFFRONTE, Univ of Modena Reggio Emilia — Hybrid spin-photons quantum bits can be obtained under strong coupling regime between microwave photons and a spin ensemble, where coherent exchange of photons is realized. Molecular spins systems, thanks to their tailorable magnetic properties, are retained promising candidates for hybrid qubits. We present an experimental study of the coupling regimes between a high critical temperature YBCO superconducting resonator [1,2] and different molecular spin ensembles. Three mononuclear compounds, $(PPh4)_2[Cu(mnt)_2]$, $[ErPc2]^-TBA^+$, Dy(trensal) and two organic radicals, DPPH and PyBTM [3], are studied. Strong coupling is found in radicals thanks to exchange narrowing. Possible strategies to achieve strong coupling with mononuclear compounds are discussed, and several hints in the design of molecular spins are given [1]. [1] C. Bonizzoni, A. Ghirri, K. Bader, J. Van Slageren, M. Perfetti, L. Sorace, Y. Lan, O. Fuhr, M. Ruben and M. Affronte Dalton Transactions (2016), 45, 16596-16603 [2] A. Ghirri, C. Bonizzoni, D. Gerace, S. Sanna, A. Cassinese and M. Affronte Appl. Phys. Lett. 106 (2015) 184101 [3] A. Ghirri, C. Bonizzoni, F. Troiani, N. Buccheri, L. Beverina, A. Cassinese and M. Affronte Phys. Rev. A 93 (2016) 063855

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