**Making supramolecular assemblies that could be used in quantum information processing**

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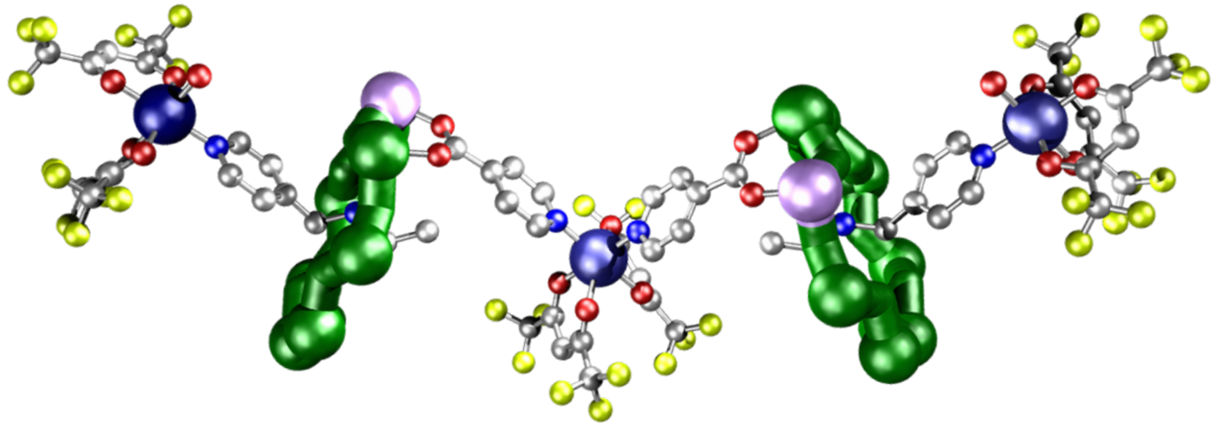
Around fifteen years ago it was proposed that molecular magnets could be used as qubits for quantum information processing.[1,2] Many groups focused on demonstrating that coherence times can be extended by chemical control.[3] The major advantage that molecules possess over other proposed hardware is the potential to control inter-spin interactions.



We are pursuing chemistry to link together heterometallic rings to make large supramolecular structures that bring together multiple such potential qubits. In some cases, we can include switchable units that allow us to propose strategies to implement entangling gates such as the CNOT or the $\sqrt{\text{iSWAP}}$ gate.[4] In other cases we have attempted to build supramolecules that could include quantum error correction,[5] and or could model decoherence in quantum teleportation.[6]

***References***

1. M. Leuenberger and D. Loss, *Nature* 2001, **410**, 789.
2. F. Meier, J. Levy, and D. Loss, *Phys. Rev. Lett.* 2003, **90**, 47901.
3. Bader *et al., Nature Commun.,* 2014, **5**, 5304; Zadrozny *et al., J. Amer. Chem. Soc.* 2014, **136**, 15841; Atzori *et al., J. Amer. Chem. Soc.* 2016, **138**, 2154; Pedersen *et al., J. Amer. Chem. Soc.* 2016, **138**, 5801; Ariciu *et al., Nature Commun.* 2019, **10**, 3330; De Camargo et al. *Angew. Chem. Int. Ed.* 2021, **60**, 2588.
4. J. Ferrando-Soria *et al., Nature Commun.,* 2016, **7**, 11377;
5. S. Lockyer *et al., Chem. Sci.,* 2021, **12**, 9104.
6. S. Lockyer *et al.,* manuscript submitted.