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Introducing copper phthalocyanine as a qubit[1] MARC WARNER, London Centre for Nanotechnology, SALAHUD DIN, Imperial College London, London, UK, JULES GARDENER, Harvard University, GAVIN W. MORLEY, University of Warwick, UK, WEI WU, Imperial College London, UK, MARSHALL STONEHAM, ANDREW J. FISHER, University College London, UK, SANDRINE HEUTZ, Imperial College London, London, UK, CHRISTOPHER W. M. KAY, GABRIEL AEPPLI, University College London, UK — Quantum information processing (QIP) has been shown to solve certain useful problems faster than its classical counterpart. However finding a physical system upon which to execute these algorithms is a challenging task. One promising implementation is to use an electron spin in a magnetic field as the information bearing quantum system. Numerous options have been proposed along these lines. Here I discuss a new candidate qubit, copper phthalocyanine. The copper atom at the centre of the molecule carries an unpaired electron. Pulsed electron paramagnetic resonance measurements of relaxation times reveal that it has potential for QIP. We measure the spin-lattice and spin-spin relaxation times of this electron and demonstrate single qubit manipulations. Solid-state electronic devices can be built with this low cost material, which is optically active, and offers great opportunities for chemical and physical modification, leading to significant control of magnetic and other properties.

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