

Selected Abstracts from Other Physical Review Journals

Abstracts of papers that are published in other Physical Review journals and may be of interest to Physical Review A readers are printed below.

Observation of the dynamical structure arising from spatially extended quantum entanglement and long-lived quantum coherence in the KHCO_3 crystal. François Fillaux , *LADIR-CNRS, UMR 7075 Université P. et M. Curie, 2 rue Henry Dunant, 94320 Thiais, France;* Alain Cousson, *Laboratoire Léon Brillouin (CEA-CNRS), C.E. Saclay, 91191 Gif-sur-Yvette cedex, France;* David Keen, *ISIS Facility, Rutherford Appleton Laboratory, Chilton, Didcot, OX11 0QX, United Kingdom, and Physics Department, Oxford University, Clarendon Laboratory, Parks Road, Oxford OX1 3PU, United Kingdom.* (Received 9 October 2002; revised manuscript received 5 December 2002; published 27 February 2003)

The crystal structures of KHCO_3 and KDCO_3 at 14 K were determined with the single-crystal neutron-diffraction technique. There is no evidence for proton/deuteron disorder. The diffraction pattern of KHCO_3 reveals rods of intensity separate from the Bragg peaks. These rods are not observed for KDCO_3 . They are attributed to diffraction by the sublattice of protons forming regular arrays of double slits parallel to the dimer planes. They reveal quantum coherence in two dimensions for the proton dynamics. It is shown that quantum statistics for fermions impose quantum entanglement and strict separation of the H dynamics from the lattice. The main decoherence mechanism for the vibrational states is thus canceled out. The vibrational ground state is a superposition of fully entangled macroscopic wave functions with long-lived quantum coherence. [Phys. Rev. B **67**, 054301 (2003)]

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