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**Title:** Experimental demonstration of fully contextual quantum correlations on an NMR quantum information processor

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**Keywords:** Quantum mechanics  
Fundamental departure  
Classical description

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**Abstract:** The existence of contextuality in quantum mechanics is a fundamental departure from the classical description of the world. Currently, the quest to identify scenarios which cannot be more contextual than quantum theory is at the forefront of research in quantum contextuality. In this work we experimentally test two inequalities, which are capable of revealing fully contextual quantum correlations, on a Hilbert space of dimension 8 and 4, respectively, on an NMR quantum information processor. The projectors associated with the contextuality inequalities are reformulated in terms of Pauli operators, which can be determined in an NMR experiment. We analyze the behavior of each inequality under rotation of the underlying quantum state, which unitarily transforms it to another pure state.


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