

Probing contextuality with superconducting quantum circuits

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ABSTRACT:

Contextuality is one of the most fundamental property which distinguishes quantum mechanics from classical theory. It has also been suggested to be the 'magical' resource responsible for an exponential speedup of a quantum computer. We will provide the first

experimental evidence of this resource for a three-level quantum system built upon superconducting circuits - one of the leading

architectures for quantum computation. By engineering dispersive shifts of the superconducting qutrit coupled to a microwave cavity we achieve strong projective binary-outcome measurement. Together with the high contrast readout based on a parametric amplifier we close both measurement and compatibility loopholes which were present in previous experimental tests.

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