

Abstract Submitted  
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**Experimental test of state-independent quantum contextuality of an indivisible quantum system** MENG LI, YUN-FENG HUANG, DONG-YANG CAO, CHAO ZHANG, YONG-SHENG ZHANG, BI-HENG LIU, CHUAN-FENG LI, GUANG-CAN GUO, Key Laboratory of Quantum Information, QUANTUM OPTICS TEAM — Since the quantum mechanics was born, quantum mechanics was argued among scientists because the differences between quantum mechanics and the classical physics. Because of this, some people give hidden variable theory. One of the hidden variable theory is non-contextual hidden variable theory, and KS inequalities are famous in non-contextual hidden variable theory. But the original KS inequalities have 117 directions to measure, so it is almost impossible to test the KS inequalities in experiment. However about two years ago, Sixia Yu and C.H. Oh point out that for a single qutrit, we only need to measure 13 directions, then we can test the KS inequalities. This makes it possible to test the KS inequalities in experiment. We use the polarization and the path of single photon to construct a qutrit, and we use the half-wave plates, the beam displacers and polar beam splitters to prepare the quantum state and finish the measurement. And the result prove that quantum mechanics is right and non-contextual hidden variable theory is wrong.

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