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On the Experimental Violation of Mermin's High-Spin Bell Inequalities in the Schwinger Representation RUFFIN EVANS, OLIVIER PFISTER, University of Virginia — Since Bell's original paper in 1964, a wide variety of experimental tests have overwhelmingly supported the completeness of quantum mechanics over local hidden-variable theories. However, relatively little effort has focused on systems of spins larger than $\frac{1}{2}$; generalizing Bell's result to higher dimensions is difficult, and the experiments needed to test these high-spin Bell inequalities are exacting. New advances in high efficiency photon-number-resolving detectors suggest that experimental tests of these inequalities should be possible in the Schwinger representation, using the continuous-variable entangled (two-mode squeezed) fields produced by an optical parametric oscillator below threshold. In this paper, we explore the realistic experimental implementation of this proposal to violate Mermin's high-spin inequalities. We demonstrate that violation for spin values greater than 1 should be attainable under a range of feasible experimental conditions that include finite squeezing and nonideal detection efficiency.

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