

Abstract Submitted
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Experimental non-classicality of an indivisible system¹ RADEK
LAPKIEWICZ, PEIZHE LI, CHRISTOPH SCHAEFF, NATHAN LANGFORD,
SVEN RAMELOW, MARCIN WIESNIAK, ANTON ZEILINGER, University of
Vienna, Faculty of Physics, Vienna; Institute for Quantum Optics and Quantum In-
formation, Austrian Academy of Sciences, Vienna — In Quantum Mechanics (QM)
not all properties can be simultaneously well defined. An important question is
whether a joint probability distribution can describe the outcomes of all possible
measurements, allowing a quantum system to be mimicked by classical means. Kly-
achko et al. [PRL 101, 020403 (2008)] derived an inequality which allowed us to
answer this question experimentally. The inequality involves only five measurements
and QM predicts its violation for single spin-1 particles. This is the simplest system
where such a contradiction is possible. It is also indivisible and as such cannot con-
tain entanglement. In our experiment with single photons distributed among three
modes (isomorphic to stationary spin-1 particles) we obtained a value of $-3.893(9)$,
which lies more than 90 standard deviations below the “classical” bound of -3 .

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Radek Lapkiewicz
University of Vienna, Faculty of Physics, Vienna; Institute for Quantum
Optics and Quantum Information, Austrian Academy of Sciences, Vienna

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