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Abstract

A Stunning Realisation: The Touted Defiance of Bell's Inequality by Quantum Probabilities Derives from a Mathematical Error †

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I shall display the mathematical error in the currently accepted derivation of the expected value of Bell's quantity "*s*" in the context of a gedankenexperiment on a single pair of photons in CHSH form. The fact that this mistaken value exceeds 2 supports the touted conclusion of quantum theorists that quantum probabilities defy Bell's inequality if the principle of local realism is presumed. The error is based on the neglect of four symmetric functional relations among the four components of *s* in a thought experiment designed to assess this principle. The expectation of the linear combination defining *s* is *not* twice the square root of 2 as is widely supposed, but rather is found to be an interval rounded to (1.1213, 2.0] when calculated via linear programming procedures. There are four dimensions of freedom in the coherent expectation polytope. I shall display the slices of this polytope as it passes through 3-D space. A comment on the maximum entropy distribution within this polytope will conclude the presentation. I shall introduce the contents of four papers relevant to the issue, which are available on Researchgate: Quantum violation of Bell's inequality: a misunderstanding based on a mathematical error of neglect; The GHSZ argument: a gedankenexperiment requiring more denken; Resurrecting the principle of local realism and the prospect of supplementary variables; More Hoojums than Boojums: quantum mysteries for no one. The GHSZ article has been published in *Entropy*.

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