Comment on "Resolution of the Einstein-Podolsky-Rosen and Bell Paradoxes"

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(Slightly modified.)

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In a recent letter,[1] Pitowsky has given a model of electron spin in which "Every electron at each given moment has a definite spin in all directions", but which, he claims, does not imply Bell's inequality. A non-Kolmogorov probability theory in the model prevents the usual proofs of Bell's inequality from going through. I give here a very simple proof of a Bell-type inequality from the quoted statement. The inequality shows that the statement is inconsistent with quantum mechanics.

Consider N pairs of electrons in the singlet state. One member of each pair moves to the left and the other to the right. Let $N(A^+ : C^+)$ be the number of pairs in which the left member has spin up in the A direction and the right member has spin up in the C direction. Let $N(A^+ C^- :)$ be the number in which the left member has spin up in the A direction and spin down in the C direction. According to the quoted statement, these are meaningful quantities. Then

$$\begin{aligned} N(A^+ : C^+) &= N(A^+ C^- :) = N(A^+ B^- C^- :) + N(A^+ B^+ C^- :) \\ &\le N(A^+ B^- :) + N(B^+ C^- :) = N(A^+ : B^+) + N(B^+ : C^+). \end{aligned}$$

Quantum mechanics predicts that if $N(A^+ : C^+)$ is measured, then

$$N(A^+ : C^+)/N \approx \tfrac{1}{2}\sin^2 \tfrac{\theta_{AC}}{2},$$

where θ_{AC} is the angle between A and C. According to the quoted statement $N(A^+ : C^+)$ exists independently of whether it is measured or not and so the approximation holds whether it is measured or not. The above inequality is inconsistent with the approximation for $\theta_{AB} = \theta_{BC} = 60^\circ$ and $\theta_{AC} = 120^\circ$

[1] I. Pitowsky, Phys. Rev. Lett. **48**, 1299 (1982).