The continuing misguided attack by (www.math.leidenuniv.nl/~gill/GA.pdf) by Richard Gill on Joy Christian's measurement framework for quantum correlations, motivates me to point out Gill's disregard for the quadratic form that drives every continuous function time-dependent physical measure.

Minkowski space -- the fundamental physical spacetime that we inhabit -- is endowed with a recursive property that trades 3 nonredundant positive definite coordinates for 1 redundant negative coordinate, such that the spacetime metric signature + + + - is continuous with the signature - - - +. We earlier showed a number theoretic formulation of the dual signature:

\[
\begin{align*}
(+)& \quad 3 \quad 5 \quad 11 \quad 23 \\
\Delta & \quad + \quad + \quad + \quad - \\
& \quad 4 \quad 8 \quad 6 \quad 4 \\
\Delta & \quad - \quad - \quad - \quad + \\
(-) & \quad 7 \quad 13 \quad 17 \quad 19
\end{align*}
\]

This recursive function is an absolute property of four-dimension spacetime. \(\Delta_+\) and \(\Delta_-\) are parallel elements of a reversible sequence, given any vector orientation of three-dimension measure. Reversibility—i.e., time—is a hidden variable forcing 2-way correspondence between arbitrary initial condition and metric endpoints, a condition demanded by a coordinate-free geometry (i.e., general relativity).

Karl Hess and Walter Philipp (http://www.pnas.org/content/98/25/14224.full) included this time parameter, as we described in an earlier attachment to this forum discussion:

“An example of outcomes for the products of equation 3.1 \((A(a,\lambda)A(b,\lambda) + A(a,\lambda)A(c,\lambda) - A(b,\lambda)A(c,\lambda) \leq +1)\) that violate Bell’s inequality is + 1 for the terms with the plus sign and – 1 for the last term with the minus sign. Because \((-1)^2 = +1\) the sum of the three terms is then + 3, which indeed violates the Bell inequality Eq (3.1)” (Hess, Einstein was Right, p. 47)

This is the identical result to our number-theoretic recursive model.

The validity of Richard Gill's, et al, (http://www.pnas.org/content/99/23/14632.full) criticism of the Hess-Philipp result depends on “... the freedom of the experimenter to choose either of two settings at the same time.”
This is untrue. The Hess-Philipp model clearly demonstrates local reversibility of the time metric, such that every initial condition (experimenter choice) is correlated with the simultaneous global condition, and every change of initial condition reverses the global state—fully deterministic, fully local and realistic.

In other words, the freedom of the experimenter to choose detector settings does not obviate the continuity of the time metric. Referring to our number theoretic example above, the outcome of pairwise correlations in a 3-dimension measure space sensitively depends on whether the initial condition is $\Delta_+$ or $\Delta_-$. 

Gill et al conclude: “Hess and Philipp’s hidden variables model is nonlocal.” This conclusion is easily refuted:

Four-dimension (Minkowski) space is endowed with a redundant element that compels reversibility—reversibility that not only shows up in our number theoretic example, it is evident in Hestenes’ geometric algebra ("spacetime algebra") in the conversion of quaternion algebra to Minkowski space, and in the Hess-Philipp result that includes a sign change in the redundant term (–1).

In Joy Christian’s framework, this culminates in the parallelism of Euclidean spheres $S^3$ and $S^7$ without ever having to mention time, because the limit of division algebras at $S^7$ compels reversibility in the 8-dimension space up to redundancy—i.e., the 4-dimension space of $S^3$ local measure ("a 4-sphere’s worth of 3-spheres” as Joy puts it) is the locally real measure space of the metaphysically real physical space. The topological characteristic of simple connectedness facilitates local reality; the real line $\mathbb{R}^3$ is compactified by a point at infinity which is everywhere manifest in the measure space.

At any rate, it is conclusive that computational outcomes on $S^2$ in Gill, et al, terms, are inadequate to show Bell’s theorem as fundamental physics. That is, as Einstein always averred: quantum theory is incomplete.