Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Jordan Algebraic Quantum Categories MATTHEW GRAYDON, Perimeter Institute, HOWARD BARNUM, University of New Mexico, COZMIN UDUDEC, Invenia Technical Computing Corporation, ALEXANDER WILCE, Susquehanna University — State cones in orthodox quantum theory over finite dimensional complex Hilbert spaces enjoy two particularly essential features: homogeneity and self-duality. Orthodox quantum theory is not, however, unique in that regard. Indeed, all finite dimensional formally real Jordan algebras — arenas for generalized quantum theories with close algebraic kinship to the orthodox theory — admit homogeneous self-dual positive cones. We construct categories wherein these theories are unified. The structure of composite systems is cast from universal tensor products of the universal C*-algebras enveloping ambient spaces for the constituent state cones. We develop, in particular, a notion of composition that preserves the local distinction of constituent systems in quaternionic quantum theory. More generally, we explicitly derive the structure of hybrid quantum composites with subsystems of arbitrary Jordan algebraic type.

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Date submitted: 14 Nov 2014 Electronic form version 1.4