Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Contextuality and state-space geometry RAYMOND LAL, University of Oxford — We shall explore the connection between state-space geometry and the Abramsky-Brandenburger sheaf-theoretic framework for classifying no-go theorems. The classic example of such a no-go theorem is the Kochen-Specker theorem. No-go results prohibit any theory from the specified class, e.g. non-contextual theories, from replicating the empirical predictions of quantum theory. The sheaf-theoretic framework allows such no-go results to be generalised according to a certain kind of topology relating to the compatibility of the measurements used. We show that there is a correspondence between a class of no-go results and a class of polygonal state-spaces. The latter is a family of models whose geometric realisation lies in the equatorial plane of the Bloch sphere. This shows that the geometry of the state space used to define a physical theory related in a crucial way to the type of contextuality the theory exhibits. In particular, it also yields an understanding of the quantitative violation that quantum theory yields for the chained Bell inequality.

Raymond Lal
University of Oxford

Date submitted: 15 Nov 2013 Electronic form version 1.4