

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

A Partially-ordered-set Based Approach to the Dirac Equation in 3+1 space-time¹ KEITH EARLE, KEVIN KNUTH, University at Albany (SUNY)
— Recent work by Knuth and co-workers has shown how insights into Einstein's Theory of Special Relativity may be obtained by careful reasoning about consistent quantification of a poset. The Feynman Chessboard problem in 1+1 spacetime can be treated from this perspective, for example. Alternative methods of solution based on techniques borrowed from statistical mechanics have also been developed over the years to solve the Feynman Chessboard model in 1+1 spacetime. One particularly intriguing solution is based on a master-equation approach developed by McKeon and Ord for 1+1 spacetime. We will show how this model may be extended to 3+1 spacetime using techniques developed by Bialynicki-Birula, thus providing an alternative derivation of the Dirac equation. An external electromagnetic field can be accommodated very naturally in the formalism from which a pleasing pictorial representation of electromagnetic interactions in the lattice picture emerges.

¹Partially supported by FRAP, University at Albany.

Keith Earle
University at Albany (SUNY)

Date submitted: 19 Nov 2011

Electronic form version 1.4