

THE EQUIVALENCE OF INERTIAL FRAMES AND WAVE-PARTICLE DUALITY IN QUANTUM MECHANICS

G. N. ORD

ABSTRACT. The equivalence principle coupled to a fixed speed of light forces space and time to be mutually dependent, resulting in a spacetime geometry that ‘tells matter how to move’¹. If the matter is represented by a point-mass, the point generates a worldline. However, if the worldline is in reality an interpolant for a quasi-periodic sequence of discrete events occurring at the Compton frequency, a discrete signal can be associated with the worldline, creating a ‘worldsignal’. The equivalence of inertial frames then associates a hypervolume-filling pattern as a representation of the ensemble of all possible boosts of the signal. The resulting wave-pattern, softened by statistical averaging, satisfies the Dirac equation. Thus the ensemble of boost images of the world signal here plays the role of waves in quantum mechanics, providing a quantum version of spacetime’s directive to matter.

DEPARTMENT OF MATHEMATICS, RYERSON UNIVERSITY, TORONTO, ONTARIO, CANADA
Email address: gord@ryerson.ca

¹“Spacetime tells matter how to move; matter tells spacetime how to curve.”, From ‘Geons, Black Holes, and Quantum Foam (2000)’ by J.A.Wheeler, p. 235.