Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Quantum elements of time and space DENNIS MARKS, Valdosta State University — Space-times of any number of spaces and times can be generated as tensor products of a time-like unit vector **T** and a space-like unit vector **S**. **T** is a 2×2 real anti-symmetric, hence trace-free, matrix squaring to $-\mathbf{I}$; **S** is a 2×2 real symmetric trace-free matrix squaring to $+\mathbf{I}$. **T** is unique up to sign, corresponding to particles and antiparticles. **S** is a qubit whose eigenvalues are the bits $+1$ and -1. Thus the quantization of space is rotationally invariant in $2d$ and Lorentz invariant in $4d$. Use **S** instead of complex numbers **C** to geometrize quantum mechanics. The simplest space-time is the Minkowskian plane with vectors **T** and **S**, which generate a geometric algebra $\{\mathbf{I},\mathbf{T},\mathbf{S},\mathbf{ST}\}$, where the bivector **ST** is space-like. It can be used as vector **X** for the Euclidean plane, along with **Y**=**S**. They generate a geometric algebra $\{\mathbf{I},\mathbf{X},\mathbf{Y},\mathbf{YX}\}$. The bivector **YX** is **T**. The Minkowskian plane and the Euclidean plane have different geometries but the same geometric algebra, which is thus the foundation of both general relativity and quantum mechanics.

Dennis Marks
Valdosta State University

Date submitted: 25 Sep 2016

Electronic form version 1.4