

Abstract Submitted  
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**Point with Precision Quaternion Series Quantum Mechanics**

DOUGLAS SWEETSER, quaternions.com — Prof. Scott Aaronson in a December, 2018 blog, "Why are amplitudes complex?" generalized QM to use quaternionic amplitudes. This led to the problem of superluminal signaling which is not physical, or as he put it, "a flaming garbage fire". I have chosen to study quaternions in quantum mechanics in a different way: use quaternion series where all the imaginary terms point in the same or opposite 3-direction which commute with themselves like complex numbers do. Experimentalists are exceptionally precise in their lab setups. This could be reflected in the math used. As Prof. Aaronson agreed, we will get back a body of work consistent with standard complex quantum mechanics and he asserted was so similar it doesn't deserve a different name. Complex numbers are a necessary mathematical abstraction. Yet what do they map to in the physical Universe? Quaternions have an interpretation in space-time: they are events, with time being real and 3D-space being three imaginary numbers. Quantum mechanics has been shown to be non-local based on experiments. I interpret that to mean one must only use space-like events because those are necessarily non-local. One must act on a quaternion series semi-group which is a finite or possibly infinite number of state dimensions.

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