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Non-Commutative Probability, Conditional Expectation Values as Weak Values

Quantum mechanics introduces two non-commutative geometric Clifford algebras, one of which describes the properties of the covering space of the symplectic manifold. This gives rise to a non-commutative probability theory with conditional expectation values that correspond to local quantum properties which appear as weak values. Examples of these are the $T^{0?}(x)$ components of the energy-momentum tensor which have been measured by Kocsis et al [Science, 332 (2011) 1170—73] for photons. This can be used for particles with non-zero rest mass where these components turn out to be none other than the Bohm momentum and energy. I will set up the theoretical background and Robert Flack will explain how we plan to measure these local variables.

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