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Louis H Kauffman* (kauffman@uic.edu), Math UIC, 851 South Morgan Street, Chicago, IL 60607-7045. *Non-Commutative Worlds and Discrete Physics.*

It has long been the case that quantization of a physical system follows the prescription: replace Poisson brackets by commutator brackets. In this way Lie algebra is fundamental to the transition between classical and quantum physics. We show how discrete calculus, starting in a commutative domain, can be naturally reformulated as a calculus of commutators in an extended non-commutative domain (so the the derivatives are represented as commuators with special elements of the algebra). In this way there is also a natural passage from discrete calculus to non-commutative domains. We show how this passage illuminates the structure of classical and quantum physics. (Received August 17, 2011)