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**Louis H. Kauffman\*** (kauffman@uic.edu), Math UIC, 851 South Morgan Street, Chicago, IL 60607-7045. *An Extended Bracket State Summation for Virtual Knots and Links.*

We define a new invariant of virtual knots and links that we call the *extended bracket polynomial* and denote by  $\langle\langle K \rangle\rangle$  for a virtual knot or link  $K$ . This invariant is a state summation over bracket states of the oriented diagram for  $K$ . Each state is reduced to a virtual 4-regular graph in the plane and the polynomial takes values in the module generated by these reduced graphs over the ring  $Z[A, A^{-1}]$ . We give numerous examples applying the extended bracket, including a new proof of the non-triviality of the Kishino diagram and the flat Kishino diagram, non-classicality of single crossing virtualizations and relationships with the Temperley-Lieb algebra and the Virtual Temperley-Lieb algebra (Brauer algebra) and their associated categories. We discuss estimation of virtual crossing number using the extended bracket state sum. Examples are given of virtual knots with arbitrary minimal embedding genus and arbitrarily high positive difference between the virtual crossing number and the minimal embedding genus. See arXiv:0712.2546. (Received January 02, 2008)