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High Energy Physics - Phenomenology

Theory of Brain Function, Quantum Mechanics and Superstrings

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Recent developments/efforts to understand aspects of the brain function at the $\{\em sub-neural\}$ level are discussed. MicroTubules (MTs) participate in a wide variety of dynamical processes in the cell, especially in bioinformation processes such as learning and memory, by possessing a well-known binary error-correcting code with 64 words. In fact, MTs and DNA/RNA are unique cell structures that possess a code system. It seems that the MTs' code system is strongly related to a kind of "Mental Code" in the following sense. The MTs' periodic paracrystalline structure make them able to support a superposition of coherent quantum states, as it has been recently conjectured by Hameroff and Penrose, representing an external or mental order, for sufficient time needed for efficient quantum computing. Then the quantum superposition collapses spontaneously/dynamically through a new, string-derived mechanism for collapse proposed recently by Ellis, Mavromatos, and

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myself. At the moment of collapse, organized quantum exocytosis occurs, and this is how a ``\em mental order'' may be translated into a ``\em physiological action''. Our equation for quantum collapse, tailored to the MT system, predicts that it takes $10,000$ neurons $\{\cal O\}(1, \{\rm sec\})$ to dynamically collapse (process and imprint information). Different observations/experiments and various schools of thought are in agreement with the above numbers concerning ``\em conscious events''. If indeed MTs, may be considered as the {\em microsites of consciousness}, then several unexplained properties of consciousness/awareness, get easily explained, including ``\em backward masking'', ``\em referal backwards in time''. The {\em non-locality} in the cerebral cortex of neurons related to particular missions, and the related {\em unitary sense of self} as well as

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