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## Quantum mechanics & the big world

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# Propositions for Discussion: "De Stellingen"

## About this Thesis

- Numerics may sustain a theoretical model, and vice versa; both of them however, acquire meaning only as interpretations of experiment.

Part II of this thesis

- The existence of a (thin) spectrum of states within the superconducting gap does not contradict the theory of superconductivity.

Part III of this thesis

- The only limitation for experimentally testing gravitation-induced quantum state reduction is the availability of quantum coherence on mesoscopic mass-scales.

Part IV of this thesis

- The (experimental) search for wavefunction collapse will become one of the primary aims of physical research within the next decade.

Based on Part III and IV of this thesis

## About Theoretical Physics

- The precise analogy between the Unruh effect and the emergence of Hawking radiation from a black hole clearly shows that the latter is a consequence only of the existence of a horizon in its quantum field theory, and is not related to the curvature of spacetime. As a corollary it also follows that "the black hole information paradox" is not a paradox, and should just be called "the black hole observer's misinterpretation."
- The generation of a Higgs mass does *not* depend on spontaneous symmetry breaking.
- There is a striking similarity between generalized Darwinian processes –such as those used to describe biological evolution, chemical pathways in enzymes and pattern formation of neural systems– and spontaneous symmetry breaking in the presence of a gauge field: evolution requires sufficient complexity, fluctuations and selection, and results in large scale uniformity but detailed randomness; the symmetry breaking requires a sufficient number of particles, a local gauge freedom and a symmetry breaking field, and results in global ordering without a locally defined orderparameter. This similarity suggests that there is a gauge-like theory (but with physical local transformations) underlying Darwin's "survival of the fittest".
- A qualitative understanding of physics and physical theories can best be obtained through pictures, not formulas.

## General Propositions

- Although general relativity and quantum mechanics cannot yet be married into one physical theory, their combined epistemology is already featured in multimedia and computer games; by going back to the classical ideal of faithfully representing the outside world, these modern works of art can surpass even T.S. Eliot's *The Waste Land* in their use of the philosophies of knowledge which follow from both relativity and quantum mechanics.
- Because consciousness is an emergent phenomenon, the internet should by now have developed an idea of its own existence; to enable it to eventually communicate that idea to us, all we need to do is to allow it sufficient freedom to evolve.
- The fact that the recently discovered 4500-year-old wooden structures at Durrington Walls form the largest known neolithic village in Britain indicates that "Stonehenge" was a palace and the seat of a powerful king rather than a cathedral or observatory.
- The requirement of attaching a list of "stellingen" to the Leiden PhD thesis is as much of an anachronism as the attachment of an appendix to the human bowel system: its original purpose (testing the academic keenness of the PhD candidate and exciting discussion within the scientific community) has long been lost. Like its anatomical counterpart, the "stellingen" should therefore be removed from the regulatory requirements at the very first sign of unease..  
... Ouch.