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The Subquantum Arrow of Time

Our solution to the quantum measurement problem [1] has exhibited that measurement outcomes just involves “frequentist” probabilities. If quantum mechanics emerges as the statistics of an underlying classical theory, we are back with radiating charges. Stabilization of matter must then occur due to energy absorption from a fluctuating background field. The hydrogen ground state is then a stationary state of energy throughput. Hence there appears an arrow of time, the subquantum arrow of time. It would be more fundamental than e.g. the entropic or cosmological arrows. One may now imagine that the background field has been created in the early Universe, such that the zero-point Planck spectrum has been filled up till some cutoff energy. This energy should be `borrowed’ from gravitation and be protected by energy conservation, while the present day cosmological constant is fine-tuned. Above this cutoff energy, there would be some classical-type of physics. The cutoff can lie anywhere above the LHC or perhaps cosmic ray energies (10^12 GeV), but it is reasonable to assume that it lies below the Planck energy. This would explain why quantum gravity has never been solved: its quantum-assumption would not be physically correct. The same would apply to string theory as a fundamental physical theory up to the Planck scale. If time permits, I discuss the implication for the hydrogen ground state in stochastic electrodynamics.

[1] Armen E. Allahverdyan, Roger Balian, Theo M. Nieuwenhuizen, Understanding quantum measurement from the solution of dynamical models, Physics Reports 525, 1—166, 2013

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