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Internal clock formulation of quantum mechanics

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The lack of external and fixed time is encoded into the canonical formalism of general relativity by means of the Hamiltonian constraint. The lack of time does not imply the lack of evolution but rather brings to the fore the role of internal clocks which are some largely arbitrary internal degrees of freedom with respect to which the evolution of timeless systems can be described. I will take this idea seriously and try to understand that what it may imply for quantum mechanics when the fixed external time is replaced by arbitrary internal clocks.

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