

Abstract Submitted
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The Problem of Time¹ NICHOLAS FRANCO, Cal Poly SLO — Classical Hamiltonian mechanics treats the time coordinate as a fixed background quantity. We can turn on gravity by introducing a dynamical metric, causing proper time to appear as an additional degree of freedom. But this additional degree of freedom ends up being a net of minus one degrees of freedom because it enforces two constraints. One of these, called the Hamiltonian constraint, ensures that the total energy of any gravitating system must remain precisely zero. If we canonically quantize gravity by imposing these constraints onto a wavefunction, the resulting wavefunction does not depend on time, since energy eigenstates do not evolve. We can conclude that quantum gravity does not approximate classical gravity, a serious problem given the experimental success of classical gravity.

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