Physics > General Physics

Derivation of the Schrödinger equation from the Hamilton-Jacobi equation in Feynman's path integral formulation of quantum mechanics

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It is shown how the time-dependent Schr\"{o}dinger equation may be simply derived from the dynamical postulate of Feynman's path integral formulation of quantum mechanics and the Hamilton-Jacobi equation of classical mechanics. Schr\"{o}dinger's own published derivations of quantum wave equations, the first of which was also based on the Hamilton-Jacobi equation, are also reviewed. The derivation of the time-dependent equation is based on an {\it a priori} assumption equivalent to Feynman's dynamical postulate. De Broglie's concepts of 'matter waves' and their phase and group velocities are also critically discussed.

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