Abstract Submitted
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Principle of Least Action and Approximations in Quantum Mechanics[1] DONALD KOBE, University of North Texas — A Lagrangian together with the Principle of Least Action (PLA) is a unifying approach used in all areas of physics to derive their fundamental equations. In quantum mechanics this approach can be used to derive the Schrödinger equation. The PLA may also be used to obtain approximate equations in quantum mechanics by using time-dependent trial wave functions. For a system with a time-independent Hamiltonian the PLA can be reduced to the Rayleigh-Ritz variational principle of time-independent quantum mechanics. For a system of many bosons a trial wave function that is a product of time-dependent single particle wave functions may be used in the PLA to obtain the time-dependent Gross-Pitaeveski equation, which is useful in describing a Bose-Einstein condensate. For a system of many fermions a trial wave function that is a product of time-dependent single particle orbitals may be used in the PLA to obtain the time-dependent Hartree-Fock equations, which are useful in atomic and nuclear physics.

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