Derivation of Schrodinger and Dirac Equations SPYROS EFTHIMI-
ADES, Fordham University — The Schrodinger equation can be derived from first
principles, contrary to the assertions offered in textbooks. To be consistent with
the framework of quantum mechanics the dynamics must be based on the averaged
energy relation. Accordingly, each eigenfunction is a specific superposition of plane
wave states that fulfills the averaged energy relation. Alternatively, starting with
the averaged energy relation, the Schrodinger equation is obtained to be the con-
dition the particle eigenfunction must satisfy, at each space-time point, in order to
fulfill the averaged energy relation. The same method is applied to derive the Dirac
equation involving potential terms. We emphasize the difference between the free
particle equations (which have single plane wave eigenfunctions) and the complete
Schrodinger and Dirac equations, and we point out the inappropriateness of the
heuristic derivations.

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