

Abstract Submitted  
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**Quantum Theory for a Total System with One Internal Measuring Apparatus** WEN-GE WANG, Univ of Sci & Tech of China — We propose a quantum theory for a total system including one internal measuring apparatus. The theory is based on three basic assumptions and a principle termed the principle of compatible description (PCD). The assumptions are: (i) Physical states of the total system can be associated with vectors in the Hilbert space. (ii) Dynamical evolution of a state vector obeys Schrödinger equation. (iii) For a physical state of the total system described by a pure vector, in which a subsystem may play the role of an internal measuring apparatus, when certain stable condition is satisfied, the pure-vector description may be given a Born-type ensemble interpretation. The PCD states that different descriptions for the same state of the total system must give consistent predictions for results of measurements performed by the internal measuring apparatus. The proposed theory lies at a meeting point of Copenhagen, Everett's relative-state, and consistent-histories interpretations of quantum mechanics. While, it provides something new: For example, the PCD imposes a restriction to vectors that can be associated with physical states, which may effectively break the time-reversal symmetry of Schrödinger equation. As an application of the theory, we derive a condition under which a two-level quantum system may have definite properties, such that it may play the essential role of a measuring apparatus.

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