Abstract Submitted
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Quantum Time of Arrival CALVIN STUBBINS, Franklin & Marshall College — A novel approach to the time of arrival probability distribution is discussed. This method is universal in the sense that it can be used for any potential. As an example, this algorithm is used to calculate the time of arrival for a one dimensional free particle gaussian wave packet. The quantum time of arrival problem is illustrated by the following question: If at time $t = 0$ a particle localized at $x = 0$ is described by the state $|\psi(t)\rangle$, when is it registered by a detector placed at $x = L$? The approach used in this study is to decompose the state vector into a superposition of orthonormal states that consist of a position eigenstate and a complementary state. Repeated interactions with the detector cause the state vector to evolve as a Markovian process. At each interaction with the detector, the state vector either collapses to the position eigenstate or to a complementary state. The detector state is modeled by randomly centering the position eigenstate according to a gaussian distribution that has the same width as the particle detector. After each interaction, the probability that a detection is made is calculated. This results in a probability distribution for the arrival time.

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