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Analysis of electron transport through quantum dots using the Hidden Markov Model (HMM) MATTHEW HOUSE, HONG WEN JIANG, Department of Physics, University of California Los Angeles — The number of electrons present on a quantum dot defined in a two-dimensional electron gas in a semiconductor heterostructure can be observed using a nearby quantum point contact (QPC), but counting the number of electrons present in the dot does not directly reveal the presence of multiple allowed states that contain the same number of electrons; i.e. different orbital or spin states. Two or more states with the same number of electrons may have different rates of transition to other, directly observable states. In this case they may be indirectly distinguishable, by analysis of the statistics of a time series of data. We present a new approach to analysis of QPC data based on the Hidden Markov Model (HMM). HMM theory provides a mathematical framework for optimally estimating the rates of transition between a system with various states, which may include states that cannot be directly distinguished from one another by observation (they are "hidden"). Statistical tests can be applied to determine if the hypothesis of a "hidden" state is justified by the data. The application of the HMM framework to the quantum dot analysis problem and preliminary results of the application of this approach to electron transport data is presented.

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