

# Calculation of Average Charge Number on the Single Electron Transistor by Quantum Monte Carlo Method

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The average charge number on the metallic single electron transistor due to the effect of Coulomb Blockade and Electron Tunneling at any temperature is calculated by using path integral Monte Carlo (PIMC) approaches. The results show that those effects are the most prominent at low temperatures, i.e.  $\beta E_C > 1$ . Additionally, the efficiencies of the Single Site Update Algorithm (SSU) and Fast Fourier Transform Algorithm (FFT) techniques are compared. We found that the FFT technique needed significantly less processing time than SSU method. In essence, the processing time of the FFT technique was approximately 38% of that of the SSU method.

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