Abstract Submitted
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Electron Tunneling Counting Statistics of a GaAs Quantum Dot at Thermal Equilibrium XINCHANG ZHANG, Physics Department of UCLA, MING XIAO, ELI YABLONOVITCH, Department of Electrical Engineering, UC Berkley, HONGWEN JIANG, Physics Department of UCLA — Full counting statistics (FCS) is an innovative way to investigate current fluctuations of mesoscopic conductors which can provide additional information beyond the conventional average current measurement [1]. Suppression of the 2nd moment and the 3rd moment were observed in a many-electron quantum dot(QD)under nonequilibrium conditions [1]. Here we studied the FCS of single electron tunneling of a GaAs QD in the few electron regime at thermal equilibrium in the in-plane magnetic fields. The device consists of a multiple-surface-gates defined GaAs QD integrated with a very sensitive, high bandwidth field effect transitor (FET) channel for the QD charge state read-out. Monitoring the FET current revealed two sequences of random telegraph signals which represent the electron tunneling onto and off the QD in real time. When the QD level is aligned with Fermi level of the reservoir, the statistics shows a maximum value of both mean (<n>) and standard deviation (σ), but a minimum skewness in its distribution function. It was also found that an in-plane magnetic field suppresses both <n> and σ, but enhances the skewness. [1], S. Gustavsson et. al, PRL 96, 76695(2006). .

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