Single-Electron Devices and Circuits in Silicon

This book reviews research on single-electron devices and circuits in silicon.

Single-electron devices and circuits in silicon provide a means to control electronic charge at the one-electron level and are promising systems for the development of few-electron, nanoscale electronic circuits. The book considers the design, fabrication, and characterization of single-electron transistors, single-electron memories, few-electron transfer devices such as electron pumps and turnstiles, and single-electron logic devices. A review of the many different approaches used for the experimental realisation of these devices is provided and devices developed during the author’s own research are used as detailed examples. An introduction to the physics of single-electron charging effects is included.