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**Single-particle energy levels and interparticle Coulomb interactions in CdSe quantum dots measured by Scanning Tunneling Spectroscopy** LUCIAN JDIRA, Institute for Molecules and Materials, Radboud University Nijmegen, The Netherlands, PETER LILJEROTH, Debye Institute, Utrecht University, The Netherlands, ERIC STOFFELS, Institute for Molecules and Materials, Radboud University Nijmegen, The Netherlands, DANIEL VANMAEKELBERGH, Debye Institute, Utrecht University, The Netherlands, SYLVIA SPELLER, Institute for Molecules and Materials, Radboud University Nijmegen, The Netherlands — Semiconductor quantum dots (QDs) provide the opportunity to study the evolution of electronic properties in a size range intermediate between molecular and solid state regime. We report a detailed size evolution analysis of the electronic structure of colloidal CdSe QDs of different sizes, by employing Scanning Tunneling Spectroscopy to individual dots. Tuning the tunnelling-in versus tunnelling-out rates allows one to show the electron occupation in the dot. The energy level structure and electron-hole Coulomb attraction in the dot are obtained by a combination of shell-tunneling spectroscopy and optical spectroscopy. The results are in agreement with tight-binding calculations. The electron-electron interactions are investigated by shell-filling spectroscopy. The tunneling spectra in this regime are analyzed by solving the master equation for electron and hole occupancy of the QD.

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