Title : Electron-nuclear feedback in a double quantum dot

Abstract: Two-electron system in the spin-blockade regime of a double quantum dot with nuclear-spin ensemble exhibits curious electron-nuclear feedback, which is studied in this work by investigating transient current to identify the electronic level structure and by analyzing the current noise to reveal the stability of the feedback. Stable feedback identified in the spin-blockade regime is useful to prepare identical Overhauser fields of the two dots. In contrast, unstable feedback in the shallow Coulomb blockade regime causes a significant Overhauser field, dominantly in one of the two dots, which cancels the external magnetic field. Stability of the feedback should be investigated for both the perpendicular and parallel components of Overhauser fields with respective to the magnetic field.