Electrondynamics of Ultrafast Energy Transfer Processes in Quantum Dots

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The elementary physical process of interatomic Coulombic decay (ICD) that is recognized as an ultrafast energy transfer process between atoms and molecules induced by long-range electron correlation, was shown to be possible, when electrons are confined in an array of two general, non-infinite binding potentials commonly used to model quantum dots (QDs). The electron bound to the left QD is radiatively excited to a resonancd state, after which it deexcites by transferring its energy to the neighboring QD, from which a second electron is emitted. In the related Interatomic Coulombic Electron Capture (ICEC) process an electron is captured by the left QD while the electron from the right QD is emitted with a different velocity. Both, ICD and ICEC, were studied by means of highly accurate electrondynamics calculations with the multiconfiguration time-dependent Hartree method. Here I will present a review of our findings with view in experimental realizations.