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Electronic properties of core-multishell semiconductor quantum wires JUSCIANE SILVA, Departamento de Ciências Exatas e Naturais, Universidade Federal Rural do Semi-Árido, ANDREY CHAVES, GIL FARIAS, Departamento de Física, Universidade Federal do Ceará, Caixa Postal 6030, Campus do Pici, 60455-900 Fortaleza, Ceará, Brazil, ROBSON FERREIRA, Laboratoire Pierre Aigrain, Ecole Normale Supérieure, Université Paris Diderot, 24 rue Lhomond, F-75005 Paris Diderot, Paris, France — The effect of eccentricity distortions in the otherwise circular geometry of core-multishell quantum wires on their excitonic transitions is theoretically investigated. Within the effective mass approximation, the Schrödinger equation is numerically solved for electrons and holes in systems with single and double radial heterostructures, whereas the resulting exciton binding energy is calculated by means of a variational approach. Our results demonstrate that for a single shell heterostructure, in-plane electric fields applied in different directions produce qualitatively different energy spectra, which can be used to identify the eccentricity of the system. For a double heterostructure, the eccentricities of the inner and outer shells play an important role on the excitonic binding energy and on the oscillator strength. Our results also show that for a single shell heterostructure with a type-II confinement, i.e. with spatially separated electrons and holes, one of the carriers exhibits either a ring-like or a dot-like energy spectrum, depending on the radius of the system. In this case, a shell-to-core confinement transition for the electron can be induced also by an external magnetic field.

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