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Geometric and Electromagnetic Field Effects on the Excitonic Properties of Core-multishell Semiconductor Quantum Wires[1] JUSCIANE SILVA[2], Sociedade Brasileira de Fsica, ANDREY CHAVES COLLABORATION[3], GIL DE AQUINO FARIAS COLLABORATION[4], SUBENIA MEDEIROS COLLABORATION[5] — The effect of eccentricity distortions in the otherwise circular geometry of coremultishell quantum wires on their excitonic transitions is theoretically investigated. Within the effective mass approximation, the Schrdinger 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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