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Resonant Transmission through Serially Connected Hexagonal Nanorings with Magnetic Flux Effects[1] ERIC HEDIN, YONG JOE, Ball State University — Nanostructures composed of six quantum dots (QDs) connected in a ring are linked together in a linear chain with each ring separated by a coupling segment from adjoining rings. A tight-binding model is used to obtain the electron transmission through an arbitrary number of rings in series as a function of energy, external magnetic field, coupling parameters, and QD site energy values. Modifications of the transmission band structure as a function of external field, due to the Aharonov-Bohm and Zeeman effects, demonstrate control over the conductance properties of the linear chain of nano-rings. Resonant transmission effects (with electron energy equal to the QD site energy values) show a complex dependence upon an interplay of magnetic flux, inter-ring coupling, and the strength of the coupling between the ring system and the external leads. For specific values of lead and ring couplings, nearly full transmission (ballistic transport) is seen to occur across a broad energy range, independent of the number of rings in series.

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Eric Hedin
Ball State University

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