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Spin-polarized transmission through multiple, series-coupled Aharonov-Bohm rings ERIC HEDIN, YONG JOE, JAMES CUTRIGHT, Ball State University, Dept. of Physics & Astronomy — Multiple, series-coupled nanoscale Aharonov-Bohm rings with a quantum dot (QD) embedded in each arm are analyzed for their transmission and current-voltage (I-V) characteristics. A tight-binding model is used to obtain the electron transmission as a function of energy. Application of an external magnetic field is shown to produce spin-polarized transmission bands as a result of Zeeman-splitting of the QD energy levels. The band structure of the multiple-ring device is studied as a function of Zeeman splitting energy, QD energy levels, and inter-dot coupling. I-V calculations correlating to the band structure demonstrate that this device can produce highly spin-polarized current with either ohmic or semiconductor behavior, depending on the Fermi energy and the Zeeman splitting energy of the system.

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