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Unique spin-polarized transmission effects in a QD ring structure
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Spintronics is an emerging field in which the *spin* of the electron is used for switching purposes and to communicate information. In order to obtain spin-polarized electron transmission, the Zeeman effect is employed to produce spin-split energy states in quantum dots which are embedded in the arms of a mesoscopic Aharonov-Bohm (AB) ring heterostructure. The Zeeman splitting of the QD energy levels can be induced by a parallel magnetic field, or by a perpendicular field which also produces AB-effects. The combination of these effects on the transmission resonances of the structure is studied analytically and several parameter regimes are identified which produce a high degree of spin-polarized output. Contour and line plots of the weighted spin polarization as a function of electron energy and magnetic field are presented to visualize the degree of spin-polarization. Taking advantage of these unique parameter regimes shows the potential promise of such devices for producing spin-polarized currents.

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