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Electron spin-polarization by means of Zeeman and Aharonov-Bohm effects in a double quantum dot ring ERIC HEDIN, ABIGAIL PERKINS, YONG JOE, Ball State University, Center for Computational Nanoscience — A mesoscale Aharonov-Bohm (AB) ring with a quantum dot (QD) embedded in each arm is studied with a tight-binding model for unique transmission properties arising from a combination of AB effects and Zeeman splitting of the QD energy levels. Theoretical analysis of this system has shown that resonance sharpening of the AB oscillation peaks occurs in a balanced ring near resonance, giving sensitive flux-dependence transmission [1]. Combining this effect with Zeeman splitting allows sensitive control of the spin-polarized output of the device. Weighted spin polarization results as a function of electron energy, perpendicular magnetic flux, parallel magnetic field, and QD coupling and energy levels are presented. In cases with perpendicular flux, the AB-oscillations exhibit non-periodicity, due to a flux-dependent shift in the QD energy levels via the Zeeman effect.

[1] E. R. Hedin, Y. S. Joe, and A. M Satanin, Jnl. of Computational Electronics, **7**, 280 (2008).

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