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Onset of spin polarization degeneracy in quantum wires ALFREDO SANCHEZ, JEAN-PIERRE LEBURTON, Univ of Illinois - Urbana — We report on the emergence of complex spin-polarized regimes arising from electron-electron interactions in quantum wires by using a three-dimensional unrestricted Hartree-Fock approach. We predict three distinct spin-polarized configurations in the presence of a finite magnetic field, two of which appear only above a concentration threshold. In the limit of vanishing magnetic fields, the electron system evolves into a pair of symmetric and degenerate regimes, indicating spontaneous spin polarization. The value of the concentration threshold and the energy of the polarized states all depend on the transverse dimensions of the wire. In particular, spontaneous spin polarization is suppressed if the wire cross section is highly asymmetric. Our investigations on spin-related effects are of significant relevance for spintronics applications and for the study of the 0.7 conductance anomaly in semiconductor quantum point contacts.

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