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Spin polarization in the Hubbard model with Rashba spin-orbit coupling on a ladder JOSE RIERA, Universidad Nacional de Rosario y CONICET, Argentina — The competition between on-site Coulomb repulsion and Rashba spin-orbit (RSO) coupling is studied on two-leg ladders by numerical techniques. Using DMRG it is found that the contribution to the current due to the RSO coupling for a fixed value of the Hubbard repulsion U reaches a maximum at intermediate values of the RSO coupling-to-hopping ratio and eventually becomes negative. This point of maximum current is correlated with the maximum value of the spin polarization between the two legs of the ladder. The most important result is that for a fixed value of the RSO coupling, the spin polarization increases with U and seems to saturate as $U \rightarrow \infty$. These behaviors are studied at various fillings in the metallic regime. Further support for these conclusions is provided by the study of persistent currents in Hubbard-Rashba models on ladder rings. The implications of this enhancement of the spin Hall effect with electron correlations for spintronic devices is discussed.

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