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Controlling the critical temperature of superconducting hybrid structures with spin-orbit coupling JABIR ALI OUASSOU, SOL JACOBSEN, JACOB LINDER, NTNU — Based on our recent publication Phys. Rev. B **92** 024510 (2015), we present theoretical predictions for the effect of spin-orbit coupling on the critical temperature of superconductor/ferromagnet bilayers. More specifically, we consider mesoscopic diffusive bilayers where the ferromagnet has (i) pure Rashba coupling and (ii) Rashba–Dresselhaus coupling, and show that one can achieve a superconducting spin-valve effect in both of these structures. Furthermore, it is shown that if the Rashba and Dresselhaus coupling have similar magnitudes, the critical temperature of the bilayer can change with over 35 percent as the in-plane magnetization is rotated by 90 degrees. In contrast to existing designs for superconducting spin-valves which require inhomogeneous magnetization, such as having multiple layers with noncollinear magnetizations, the critical temperature in our proposed setup is tunable with one single homogeneous ferromagnet. Thus, these results highlight a new way to exert control over superconductivity in proximity structures, which may prove easier to manufacture and control than the existing designs.

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