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Electrostatic effects in semiconductor-superconductor heterostructures. PIYAPONG SITTHISON, TUDOR STANESCU, West Virginia University — We study the effects of an interface-induced bias on the charge distribution, proximity-induced superconducting gap, and spin-orbit coupling strength in semiconductor-superconductor hybrid structures. The effective bias potential is generated by the work function difference across the interface. We show that the size of the induced superconducting gap (relative to the bulk gap) depends on the geometry of the structure and, in addition, is controlled by two effective parameters: the work function difference and the effective semiconductor-superconductor coupling. The interface-induced bias also breaks inversion symmetry, which leads to a nonzero value of the Rashba spin orbit coupling. We systematically study the dependence of the induced gap and Rashba coupling strength on the geometry of the structure (e.g., the diameter of the wire) and the relevant effective parameters (i.e. work function difference and semiconductor-superconductor coupling strength).

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