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Controllable electron interactions in quantum dots coupled to nanowires ALEXANDRE TACLA, Department of Physics and SUPA, University of Strathclyde, GUANGLEI CHENG, MICHELLE TOMCZYK, JEREMY LEVY, Department of Physics and Astronomy, University of Pittsburgh, ANDREW DALEY, Department of Physics and SUPA, University of Strathclyde, DAVID PEKKER, Department of Physics and Astronomy, University of Pittsburgh — We theoretically study transport properties in quantum dot devices proximity coupled to superconducting nanowires. In particular, we investigate the controllable transition from resonant pair tunneling to Andreev bound states, which has been recently observed in nanodevices fabricated at the interface of the oxide heterostructure $LaAlO_3/SrTiO_3$. We show that such a transition in transport features can signify a Lifshitz transition, at which electron interactions change from attractive to repulsive. We also discuss an alternate description in terms of magnetic impurities.

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