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Spin-dependent tunneling into an empty lateral quantum dot PETER STANO, PHILIPPE JACQUOD, Physics Department, University of Arizona, 1118 E 4th Street, Tucson, Arizona 85721, USA — In a recent experiment [Phys. Rev. B **78**, 041306(R) (2008)] Amasha *et al.* reported a strong spin dependence of the rate for electrons to tunnel into an empty quantum dot in a Zeeman field. Such dependence is intriguing, as one expects tunneling rates to depend on the orbital structure of the wavefunction, over which a Zeeman field has no effect. In search for an explanation, we find two mechanisms leading to a spin-dependent tunneling rate. The first originates from different electronic g-factors in the lead and in the dot, and favors the tunneling into the spin ground (excited) state when the g-factor magnitude is larger (smaller) in the lead. The second is triggered by spin-orbit interactions via the opening of off-diagonal spin-tunneling channels. It systematically favors the spin excited state. Numerically modeling the experimental setup, we find that in GaAs the spin-orbit interaction is unable to explain the experimental results, as it leads to no more than a $\sim$10% discrepancy in the spin up vs spin down tunneling rates. We conjecture that the significantly larger discrepancy observed experimentally originates from the enhancement of the g-factor in the laterally confined lead. Reference: P. Stano and Ph. Jacquod, Phys. Rev. **B** 82, 125309 (2010)

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