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Role of surface anisotropy for magnetic impurities in electron dephasing and energy relaxation and their size effect ALFRED ZAWADOWSKI, Institute of Physics, Budapest University of Technology and Economics, Hungary and Research Institute for Solid State Physics, Budapest, Hungary, ANTAL JAKOVAC, ORSOLYA UJSAGHY, Institute of Physics, Budapest University of Technology and Economics, Hungary — Recently the electron dephasing and energy relaxation due to different magnetic impurities have been extensively investigated experimentally in thin wires. It was shown earlier [1] that a magnetic impurity in a metallic host with strong spin-orbit interaction experiences a surface anisotropy of the form $H = K_d(\mathbf{nS})^2$ which causes size effects for impurities with integer spin. The dephasing and the energy relaxation are influenced by the surface anisotropy in very different ways for integer spin having a singlet and for half-integer spin with a Kramers doublet ground state [2]. Thus for $S = 1$ the dephasing is frozen out at low temperatures. That must also result in strong size effects and may resolve the puzzle between the impurity concentrations estimated from the measured electron dephasing and energy relaxation [3,4]. [1] O. Újsághy, A. Zawadowski, and B. L. Gyorffy, Phys. Rev. Lett. **76**, 2378 (1996). [2] O. Újsághy, A. Jakovác, and A. Zawadowski, to be published in Phys. Rev. Lett. [3] F. Pierre, H. Pothier, D. Esteve, M. H. Devoret, A. B. Gougam, N. O. Birge, cond-mat/0012038 and references therein. [4] G. Göppert, Y. M. Galperin, B. L. Altshuler, and H. Grabert, Phys. Rev. **B66**, 195328 (2002).

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