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Effects of spin relaxation on trap-assisted tunneling through ferromagnetic metal-oxide-semiconductor structures VIKTOR SVERDLOV, SIEGFRIED SELBERHERR, Institute for Microelectronics, TU Wien — A signal measured within a three-terminal setup at room temperature [1,2] is attributed to the spin injection from a ferromagnetic electrode into n-silicon; however, its amplitude is orders of magnitude larger than predicted by theory [3]. The reasons for this discrepancy are heavily debated [3-6], with trap-assisted resonant tunneling [4] and spin-dependent magnetoresistance gaining recognition. However, effects of spin relaxation important at room temperature were not considered in [4]. To elucidate the role of spin relaxation and coherence, corresponding Lindblad terms are added to the equation for the density matrix evolution of spin on a trap coupled to ferromagnetic contacts. Fast spin relaxation suppresses the magnetoresistance modulation. Interestingly, strong decoherence at fixed spin lifetime results in a more pronounced magnetoresistance modulation and in a narrower magnetoresistance linewidth as a function of the perpendicular magnetic field. 1.S.P.Dash *et al.*, Nature **462**,491 (2009). 2.C.Li *et al.*, Nature Commun.**2**, 245 (2011). 3.R.Jansen, Nature Mater.**11**, 400 (2012). 4.Y.Song and H.Dery, PRL **113**, 047205 (2014). 5.A.Spiesser *et al.*, PRB **90**, 205213 (2014). 6.K.-R.Jeon *et al.*, PRB **91**, 155305 (2015).

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