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**Time-Reversal Symmetry and Electron Spin Relaxation of Lithium Donors in Silicon**[1] V.N. SMELYANSKIY, NASA Ames Research Center, A.G. PETUKHOV, South Dakota School of Mines and Technology, A.M. TYRYSHKIN, S.A. LYON, Princeton University — We report theoretical and experimental studies of longitudinal electron spin relaxation time of interstitial shallow Li donors in Si. Ground state of a donor electron has a unique ten-fold (near) degeneracy which is only slightly lifted by stresses, magnetic field and spin-orbital interaction. Despite this degeneracy, we predict, on the basis of the time-reversal symmetry and weakness of the umklapp phonon processes, an extraordinary long relaxation times for lithium donor electron spin for the temperatures below 0.3 K. Strong temperature dependence of the spin relaxation time is due to activation-type processes with several activation exponents. Experimentally observed traces of magnetization reversal and longitudinal spin relaxation times at $T = 2.1$ K and $T = 4.5$ K are in remarkably close agreement with the theory.

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