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Optical pumping of electron and nuclear spin in a negatively-charged quantum dot ALLAN BRACKER, ERIC STINAFF, MORGAN WARE, DAN GAMMON, ANDREW SHABAEV, JOSEPH TISCHLER, ALEXANDER EFROS, Naval Research Laboratory, DAVID GERSHONI, Technion-Israel Institute of Technology, VLADIMIR KORENEV, IGOR MERKULOV, A.F. Ioffe Institute — We report optical pumping of electron and nuclear spins in an individual negatively-charged quantum dot. With a bias-controlled heterostructure, we inject one electron into the quantum dot. Intense laser excitation produces negative photoluminescence polarization, which is easily erased by the Hanle effect, demonstrating optical pumping of a long-lived resident electron. The electron spin lifetime is consistent with the influence of nuclear spin fluctuations. Measuring the Overhauser effect in high magnetic fields, we observe a high degree of nuclear spin polarization, which is closely correlated to electron spin pumping.

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