Spin Switching and Magnetization Reversal in Single-Crystal NdFeO$_3$\(^1\) SHUJUAN YUAN\(^2\), Shanghai University, China, FANG HONG, University of Wollongong, Australia, LA CHEN, YABIN WANG, WEI REN, JINCANG ZHANG, SHIXUN CAO, Shanghai University, China, GANG CAO, University of Kentucky, USA — We report results of our recent study of single-crystal NdFeO$_3$ that features a strong interaction between 3d and 4f electrons, which generates two distinct magnetic states ordered at 17 K and 170 K. This study reveals novel magnetic behavior that is highly sensitive to the orientation and history of magnetic field and is characterized by the following: (1) sharply contrasting magnetization, $M(T)$, along the $a$ and $c$-axis; (2) an abrupt spin-switching along the $a$-axis via a first-order transition below 17 K when the system is zero-field-cooled; and (3) a progressive magnetization reversal when the system is field-cooled. Such behavior suggests an exotic ground state driven by an extraordinary coupling between spin, orbit and lattice degrees of freedom.

\(^1\)This work was supported by the National Natural Science Foundation of China via Grants NSFC 11274221, 50932003, 11074163 and 11274222.

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