

Abstract Submitted
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Ultrafast magnetization Dynamics of Antiferromagnetic NiO M. FIEBIG, N.P. DUONG, T. SATOH, Max Born Institute, Max-Born-Str. 2A, 12489 Berlin, Germany — The dynamics of antiferromagnetic (AFM) compounds is substantially different from that of ferromagnets: Magnetic switching is facilitated by the absence of a macroscopic magnetic moment, so that spin reversal within 10-100 fs was predicted, and the discrete states of AFM dielectrics can lead to long coherence times. We investigated the magnetization dynamics of the AFM exchange-bias compound NiO by optical pump/probe experiments using second harmonic generation as probe of the AFM order. A photoinduced ultrafast reorientation of the Ni²⁺ spins within 100 fs was observed and detected by quantum beating between the hard- and easy-axis state of the crystal. The lifetime of the photoinduced state is 1 ns and limited by spin-lattice relaxation. However, a second laser pulse can trigger an ultrafast return of the system into the ground state so that controlled switching of an AFM order parameter was demonstrated for the first time. [Phys. Rev. Lett. **93**, 117402 (2004)]

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