

# Ultrafast Nanomagnetism

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One of the key drivers for information technology is the quest for “smaller and faster” information processing and storage. The ultimate speed limit is the speed of light. The idea to change and control properties of materials with the help of femtosecond laser pulses, the shortest stimuli in contemporary experimental physics, has, therefore, long intrigued researchers. In this lecture I will focus on how transient femtosecond electric fields can be used to change magnetic properties of materials [1,2] and in particular, how nanoscale spin textures emerge from the laser-induced demagnetized state [3,4]. This demonstrates how XFELs allow us to follow the flow of energy and angular momentum between electron, spins and lattice quasiparticles in real time.

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[4] D Turenne, et al., *Sci. Adv.* **8**, eabn0523 (2022).