

# Computational simulations of ultrafast and light induced magnetization processes

RICHARD F L EVANS

*Department of Physics, University of York, United Kingdom, [richard.evans@york.ac.uk](mailto:richard.evans@york.ac.uk)*

Ultrafast magnetization processes have become one of the most exciting areas of magnetism since the turn of the 21<sup>st</sup> century. However, the complexity of the underlying physical processes has required the development of new computational models to understand and explore the behaviour of magnetic materials under extreme conditions. We will cover the development of atomistic spin models and their application to a thermodynamic understanding of ultrafast magnetic processes. We will explore the importance of realistic materials models for different classes of materials including GdFe and permalloy and their intrinsic magnetic properties. We will then cover the role of thermodynamics in ultrafast magnetization processes and how they can explain a diversity of observations of laser induced magnetization dynamics. Finally, I will recall how such computational models predicted the existence of pure thermally driven magnetization switching and an outlook to the future of computational models of magnetic materials.