

Understanding ultrafast magnetization dynamics from first principles

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Laser induced ultrafast magnetization dynamics has attracted a lot of attention in recent times due to the possibility of optically induced switching of magnetization in a sub picosecond time scale and thereby opening up novel routes for realizing fast and efficient devices. In this talk, I will discuss the general aspects from the point of view of theory and experiments. Specifically, the importance of ab initio materials specific simulations via atomistic spin dynamics in the understanding of experimental observations will be highlighted. It will be demonstrated how density functional theory based calculations can be helpful in solving Landau-Lifshitz-Gilbert equation of motion for studying atomistic spin dynamics. The examples will be (i) remagnetization dynamics of elemental ferromagnets, (ii) demagnetization behaviour of amorphous FeGd alloys and the influence of chemical inhomogeneity and (ii) effect of finite temperature on the demagnetization properties of Co and CoMn alloys.