

Pushing the limits of magnetism towards energy-efficient applications

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Abstract:

As the world population approaches 8.2 billion, it is estimated that 67% of its people have access to different types of data networks. This has led to an escalating demand for storage and electricity consumption with information technology predicted to exceed the world electricity supply by 2037. In this presentation, we will discuss how different quantum materials (Weyls, van der Waals (vdW), Kagome, etc.) can provide new playgrounds for applications and fundamental exploration of quantum-effects, topological spin-excitations and ultrafast laser pulses towards energy-efficient device platforms. Some recent results of ultrafast laser excitations on different vdW heterostructures will be shown towards all-optical control of their magnetic properties with efficient heat management. We will discuss how the interplay between magnet, substrate choice and femtosecond excitations can be used to achieve all-heat control of magnetization dynamics on-demand. We will finalize discussing the current and near-future challenges on the implementation of novel magnets in high performance storage technologies.