Extracting spin from an antiferromagnet at picosecond timescales

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Interfaces in heavy metal– antiferromagnet heterostructures have recently become highly investigated and debated systems in the effort to create spintronic devices that function at terahertz frequencies. Such heterostructures have great technological potential because antiferromagnets can generate sub-picosecond spin currents which the heavy metal can convert into charge signals.

In this talk I will present our recent work on the optically induced picosecond spin transfer from antiferromagnets to Pt using time-domain THz emission spectroscopy. We will focus on two studies in antiferromagnetic insulators $KCoF_3$ and $KNiF_3$, and in antiferromagnetic metal FeRh.

Through our studies, we are able to shine light on the microscopy of spin transfer at picosecond timescales and identify key figures of merit for its efficiency. Our results are important for progressing in the fundamental understanding of the highly discussed physics of the heavy metal/antiferromagnet interfaces, which is the necessary cornerstone for the designing of femtosecond antiferromagnetic spintronics devices with optimized characteristics.