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**All-optical switching by domain wall motion in Co/Pd superlattices with a high-repetition-rate laser** FARZANEH HOVEYDA, ERICH HOHENSTEIN, SERBAN SMADICI, Univ of Louisville — All-optical switching (AOS) of magnetization with femtosecond laser pulses has been demonstrated in ferri- and ferromagnetic materials. Current models mostly correlate ultrafast reversal with the uniform rotation of magnetization. In addition, while single-pulse switching in ferrimagnets has been reported, AOS in ferromagnetic Co/Pt has also been observed with overlapping pulses. This suggests the possibility to initiate a magnetization reversal with a high repetition rate laser. In our work, ferromagnetic Co/Pd superlattices, deposited by e-beam evaporation, were scanned under a high repetition rate Ti:Sapphire laser beam. Imaging with polarizing and magnetic force microscopes confirmed that AOS was attained. Intriguingly, measurements with a chopped beam showed a few ms delay before the reversed domains become visible. These domains gradually expanded by domain wall motion. We explain the delay with heat accumulation due to the high-repetition-rate laser pulses. The heat accumulation introduces in-plane thermal gradients, which apply forces on the magnetic domain walls. This suggests a model of the observed reversal by thermally driven domain wall motion.

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