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Ultrafast frustration of the magnetization in exchange biased Ni/FeF2[1] AMIT PORAT, School of Physics and Astronomy, Tel-Aviv University, Tel Aviv 69978, Israel, IVAN K. SCHULLER, Physics Department, University of California - San Diego, La Jolla, CA 92093-0319, SHIMSHON BAR-AD, School of Physics and Astronomy, Tel-Aviv University, Tel Aviv 69978, Israel — We used the magneto optical Kerr effect to study fast optically-induced magnetization dynamics in a Ni/FeF_2 exchange bias bilayer. We find that sub-picosecond laser pulses trigger an unexpected out of plane precession of the Ni magnetization, surprisingly in external magnetic fields that overcome the exchange bias (unlike previously reported precessions in bilayers). Even more surprisingly the precession persists for excitation intensities that completely decouple the Ni from the FeF_2. The experimental results suggest that the FeF_2 layer at the thermally-excited interface is frustrated by the opposing anisotropy fields created by the external field, the Ni layer, and the underlying thermally unexcited FeF_2 layer. The frustrated FeF_2 layer reorients, which in turn triggers the precession of the Ni. This implies that the decoupling at high excitation intensities does not only involve the Ni, but also the interfacial FeF_2 layer, which decouples from the cold underlying bulk FeF_2. The decoupling thus leads to a reversal of the exchange bias, as we found experimentally.

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