**Retraction: Néel Spin-Orbit Torque Driven Antiferromagnetic Resonance
in Mn₂Au Probed by Time-Domain THz Spectroscopy
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In our recently published Letter we reported the observation of a pronounced resonance mode centered at 1.1 THz in a metallic collinear antiferromagnet Mn₂Au. Based on the temperature dependence of the mode frequency, the large oscillator strength, and its temperature dependence, we attributed the mode to the in-plane antiferromagnetic resonance (AFMR) driven by the Néel spin-orbit torque (NSOT) [1]. After publication, complementary room temperature measurements were performed at the FZU Prague, failing to reproduce the result. We realized that the observation was due to an experimental error, caused by the mislabeled thickness of the electro-optical crystal (EOC) used in the original measurement. In particular, the multiple reflections of the THz pulse at the substrate-air and film-substrate interfaces result in a series of weak THz pulses trailing the main transmitted THz pulse, separated in time by twice the optical path through the substrate. Similarly, reflections from the EOC-air surfaces of the near-infrared (NIR) sampling pulse result in a series of (weak) NIR pulses propagating through the EOC, separated in time by twice the optical path of the NIR pulse through the EOC. The two optical paths are normally different (by choosing the thickness of the EOC or substrate), and the weak ghost signals are well-separated in time from the main sampled electric-field transient. In our case, due to mislabeling, the optical paths of the THz and NIR pulses were accidentally perfectly matched, resulting in a weak ghost reflection exactly at the center of the sampling window. As the intensity of the ghost pulse was much stronger when THz pulse was reflected from film-substrate interface (sample) than from the substrate-air interface (reference substrate), this ghost reflection gave rise to the seeming resonance. The temperature dependence of the mode's parameters can be linked to the T dependence of the substrate's refractive index and the conductivity of Mn₂Au. By exchanging the EOC crystal this artifact at 1 THz disappeared. A similar, yet weaker spectral feature around 1.3 THz remained. Since the weaker mode at 1.3 THz could indeed be the sought-after AFMR, possible additional artifacts (caused by the birefringence of the substrate or by the buffer layer) had to be excluded first. We made a series of additional measurements on samples grown under different conditions. The final measurements performed on Mn₂Au films grown without the buffer layer and being Néel vector oriented in high magnetic fields [2] for increased contrast show no clear evidence of an AFMR mode in THz absorption. We conclude that the NSOT-driven AFMR absorption is weaker than our experimental uncertainty. While we cannot exclude that with increased sensitivity such a mode can be observed in a THz transmission experiment, we wish to retract our original Letter.

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