Progress toward terabit-rate high-density recording

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Research is closing in on the next-generation of ultra-high-density magneto-optical storage devices that could store more than 6,000 Terabits (6 petabits) of data, more than 70 times the contents of the entire U.S. Library of Congress, on a single 5-inch disc. Yet the vast storage amount is limited by the ability to write data quickly enough to the device.

In the Journal of Applied Physics, researchers at Sun Yat-Sen University in China have demonstrated a way to record on ferromagnetic films using a laser-assisted ultrafast magnetization reversal dynamics.

The technique uses so-called time-resolved polar Kerr spectroscopy combined with an alternating magnetic field strong enough to re-initialize the magnetization state of gadolinium-iron-cobalt (GdFeCo) thin films. Tianshu Lai and colleagues showed that the magnetization reversal could occur in a sub-nanosecond time scale, which implies that next- generation magneto-optical storage devices can not only realize higher recording densities but also ultrafast data writing of up to a gigahertz. Such speed is at least thirty times faster than that of present hard disks in computers.

Laser-assisted magnetic recording was demonstrated on a sub-picosecond time scale under a saturated external magnetic field. "We found that the rate of magnetization reversal is proportional to the external magnetic field," says Lai, "and the genuine thermo-magnetic recording should happen within several tens to hundreds of picoseconds

when we apply a smaller magnetic field than the coercivity of the recording films."

More information: The article, "Field-dependent ultrafast dynamics and mechanism of magnetization reversal across ferrimagnetic compensation points in GdFeCo amorphous alloy films" by Tianshu Lai, Zhifeng Chen, Ruixin Gao, Zixin Wang, Chudong Xu and Daxin C. (Zhongshan (Sun Yat-Sen) University) appears in the *Journal of Applied Physics*. link.aip.org/link/japiau/v108/i2/p023902/s1

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