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Imprinting magnetic information in manganites with X-rays

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Manganite compounds have attracted a lot of the scientific interest by virtue of the unusual electronic and magnetic properties among them 'colossal magnetoresistance', and large magnetoresistive response. Here we report the writing, the in-situ observation and erasing of magnetic bits to $\text{Pr}_{0.5}\text{Ca}_{0.5}\text{MnO}_3$ by illuminating with X-rays. Opposite to what is known so far, the antiferromagnetic magnetic signal increased, the magnetic order improved and the magnitude of the imprinted information could be controlled. We attribute this effect to the canting of manganese magnetic moments by the X-rays, accompanied by changes in the structure established by increase of the conductance. This photodoping effect manifests strong interaction of X-rays with magnetic structures and contributes to further understanding of photoconductivity. Furthermore, the ability to imprint information with a new technique may also lead to further insight in the interaction of X-rays with matter and a new development of memory devices.

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