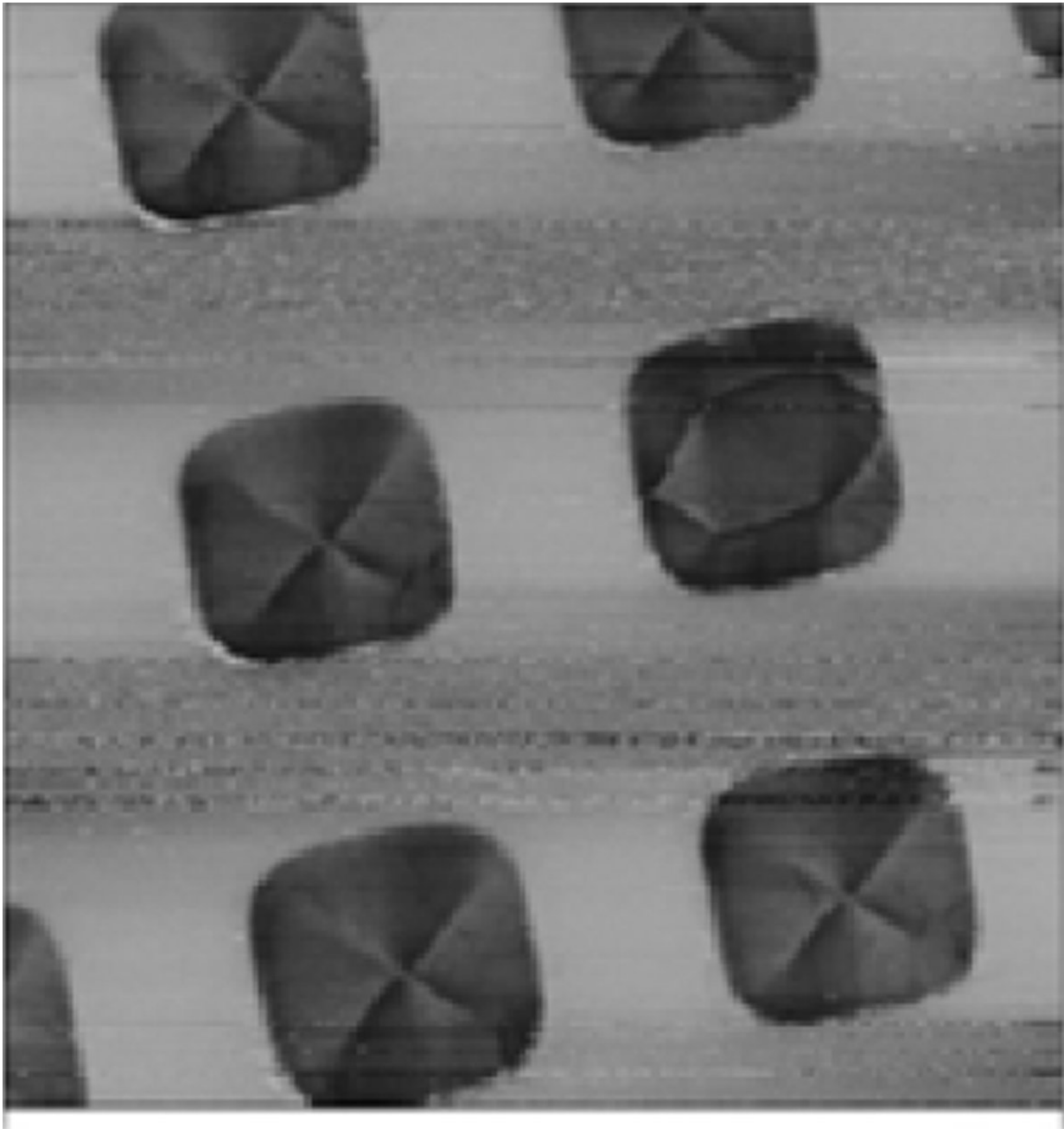


# **Futuristic data storage based on controlling the interactions between nanodots magnetic 'mood' twirls**

June 19 2018

---



**3 $\mu$**

Force microscopy image of the magnetisation structure for a part of the array of square elements. Credit: Springer

The magnetisation of nanometric square material is not fixed. It moves around in a helical motion. This is caused by the electron whose degree of freedom, referred to as spin, which follows a precession motion centred on the middle of a square nano-magnet. To study the magnetisation of such material, physicists can rely on two-dimensional arrays of square nanomagnets.

In a paper published in *EPJ B*, P. Kim from the Kirensky Institute of Physics, associated with the Russian Academy of Sciences, in Krasnoyarsk, Siberia, Russia, and colleagues have devised a new model taking into account the factors affecting the magnetic interaction between individual nanomagnets. Better controlling such nanomagnets arrays could have applications in ultrahigh density data storage, in an electronic application called spintronics exploiting electron spins and its magnetism, and in micro- and nanosurgery controlled by magnets.

The development of high-density data storage devices requires the highest possible density of elements in an [array](#). However, the closer they are together, the greater the magnetic interactions between individual magnetic nanosquares. This translates as multiple magnetic resonance lines instead of the single resonance line that exists when these squares are further apart. This means that this multiple [resonance](#) stems from the several types of vibrational modes across the individual nanomagnets aligned with several vibrational modes of the overall array—instead of a single vibrational mode when the squares are further apart.

The originality of this work lies in the [square](#) geometry of the chosen nanomagnet. Unlike previous studies using different geometries, this work examines various combinations of polarity and chirality in arrays of a large number of elements.

**More information:** Petr D. Kim et al, Collective motion of

magnetization in two-dimensional arrays of square elements, *The European Physical Journal B* (2018). [DOI: 10.1140/epjb/e2018-90006-0](https://doi.org/10.1140/epjb/e2018-90006-0)

Provided by Springer

Citation: Futuristic data storage based on controlling the interactions between nanodots magnetic 'mood' twirls (2018, June 19) retrieved 23 April 2024 from <https://phys.org/news/2018-06-futuristic-storage-based-interactions-nanodots.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.