RETHINKING DESIGN

ETH Zurich Meets Davos during the World Economic Forum's Annual Meeting (22 – 25 January 2019)

Information, photographs, and video footage

Big Bang in a Crystal

Zurich, 15 December 2018

Multiferroics are a new type of material that combines magnetic and electrical properties in a unique way. The crystal materials can be useful for building electronic devices with ultra-low power consumption, but multiferroics can do much more. The pattern of electrical charges in ErMnO3 (see image below) simulates the processes that happened in the early universe right after the Big Bang.

Unlike many other materials that have either a magnetic or an electric order, multiferroics possess both. They are magnetically and, at the same time, electrically polarized. As a consequence, they align themselves both along magnetic and along electrical fields. The physical mechanisms that bring about the magnetic and electric order inside the material coupled. The unique properties make it possible to influence the magnetization through more efficient electrical fields, rather than magnetic fields. In computing, data is continually written to magnetic hard drives, multiferroics; however, could present significant energy savings in future of computing.

Multiferroic Crystals - ETH Zurich Pavilion in Davos

Experience a demo and speak directly with the researchers from the at the ETH Zurich Pavilion in Davos during the 2019 World Economic Forum's Annual Meeting.

Bios / publications

Nicola Spaldin, Full Professor at the Department of Materials
https://www.ethz.ch/en/utils/search.MTc3MjY0.html?pagetype=people&search=nicola+spaldin&language=en&lang_filter=false

References

ETH Zurich Professor Nicola Spaldin - video
https://www.youtube.com/watch?v=SfVQi4w8ebw

ETH Zurich Department of Materials
http://www.theory.mat.ethz.ch/
http://www.theory.mat.ethz.ch/research/multiferroics-and-beyond.html

Perfect Inversion – article
https://www.ethz.ch/en/news-and-events/eth-news/news/2018/08/perfect-inversion.html

Big Bang under the Microscope – article
http://www.ethlife.ethz.ch/archive_articles/130103_cosmic_strings_su/index_EN.html

Images

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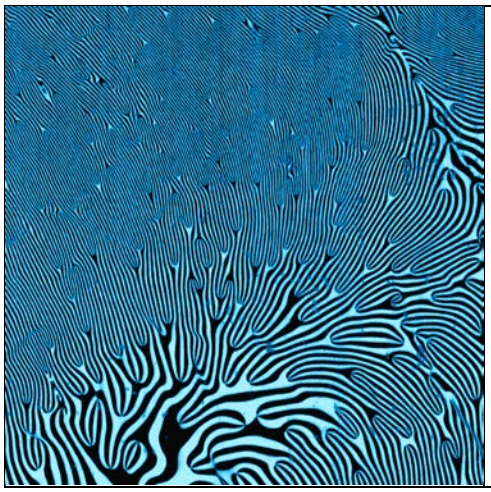
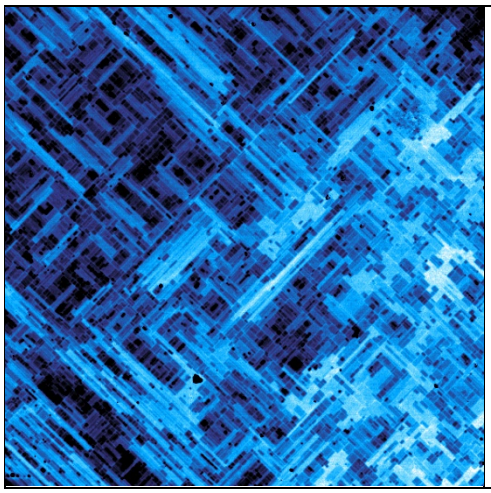


Big Bang in a Multiferroic Crystal

The pattern of electric charges in ErMnO3 (image above) simulates processes that happened in the early universe right after the Big Bang.



Multiferroic Crystal - SMOonLSAT