Moving Barkhausen Effect forward

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Almost 100 years after the initial discovery, a team of scientists at the University of Alberta and the National Institute for Nanotechnology in Edmonton have harnessed the Barkhausen Effect as a new kind of high-resolution microscopy for the insides of magnetic materials.

The researchers say the technique has the potential to provide critical information as a rapid prototyper for magnetic computational devices that expand the role of magnetism within computers.

In 1919, Barkhausen discovered the first evidence of magnetic domains (patterns in how the directions of magnetism are organized, which occur inside all magnetic materials). This marked a milestone in the development of the modern understanding of magnetism.

The Alberta researchers measure the Barkhausen jumps of magnetization for a special 'vortex' pattern, which is scanned around the inside of their sample by the application of magnetic fields.

Analysis of the jumps converts the vortex pattern into a probe of magnetic interactions on the scale of billionths of a metre. The analysis was made possible by a model describing the 'stick-slip nature of the jumps; an effect describable previously only in complex computer simulations.

U of A graduate students Jacob Burgess and Alastair Fraser, from the physics group of of professor Mark Freeman, were co-lead authors of the research paper, appearing in the journal *Science*, online Jan. 17.

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