Physicists observe new magnetic state of bismuth ferrite

May 1 2013

(Phys.org) —Using computer models, a graduate student at the University of Arkansas has collaborated with scientists in the United States and Europe to observe a new magnetic state of bismuth ferrite.

These scientists and Dovron Rahmedov, a doctoral student in physics, published the results Monday, April 28, in the advance online edition of the journal *Nature Materials*. Laurent Bellaiche, a professor of physics, also contributed to the paper. Rahmedov and Bellaiche conducted their research in the physics department and Institute for Nanoscience and Engineering at the University of Arkansas.

Bismuth ferrite is a compound that can change its electrical polarization when under a magnetic field or magnetic properties when under an electric field. Because of these effects, bismuth ferrite interests researchers who want to design novel devices—based on magneto-electric conversion.

"Bismuth ferrite is a very unusual material," Rahmedov said. "It is a multifunctional material that can open a door to a future generation of memory devices. In the published work we have collaborated with several European groups to investigate the behavior of the material under epitaxial strain."

Epitaxial strain is the technical phrase for a deformity in the material, which arises from the substrate on top of which the material is grown, Rahmedov said.

"Under such strain the magnetic structure of the bismuth ferrite passes through three different magnetic states, and one of those states is unexpected and was not observed before," he said. "Considering the complexity and importance of this material, the discovery of new magnetic states of the material is an important breakthrough in this field. Despite a flurry of research in recent years to study this material, bismuth ferrite keeps surprising us with its new properties."

Provided by University of Arkansas