# Two-Dimensional Fluctuating Superconductivity

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Scientists at Brookhaven Lab have discovered a state of two-dimensional (2D) fluctuating superconductivity in a high-temperature superconductor with a particular arrangement of electrical charges known as "stripes."

The finding was uncovered during studies of directional dependence in the material's electron-transport and magnetic properties. In the 2D plane, the material acts as a superconductor - conducts electricity with no resistance - at a significantly higher temperature than in the 3D state.

"The results provide many insights into the interplay between the stripe order and superconductivity, which may shed light on the mechanism underlying high-temperature superconductivity," said Brookhaven physicist Qiang Li, who presented this work at the American Physical Society meeting, March 10-14, 2008.

Understanding the mechanism of high-temperature superconductivity is one of the outstanding scientific issues in condensed matter physics, Li said. Understanding this mechanism could lead to new strategies for increasing the superconducting transition temperature of other superconductors to make them more practical for applications such as electrical transmission lines.

"As electricity demand increases, the challenge to the national electricity grid to provide reliable power will soon grow to crisis levels," Li said. "Superconductors offer powerful opportunities for restoring the reliability of the power grid and increasing its capacity and efficiency by

providing reactive power reserves against blackouts, and by generating and transmitting electricity."

Source: Brookhaven National Laboratory