

PHYSICS NEWS FLASH

It's Fun to Play with the YBCO

UT-ORNL Scientists Move Closer to High-Tc Superconducting Wires

April 10, 2006

Physics Professor Jim Thompson is part of an ORNL-UT scientific team inching closer to making wires that can carry electricity with no resistance, opening up the possibility of motors and magnets made of superconductors. The results were published in “High Performance High-Tc Superconducting Wires” in the March 31 issue of *Science*.

As *Science*'s Robert F. Service explains in a “News of the Week” piece appearing in this issue, high-Tc wires are those that can carry electricity without resistance at temperatures well above absolute zero, although still significantly lower than room temperature. Yet their success has been inconsistent, in part because previous wires—made of bismuth, strontium, calcium, copper and oxygen—were expensive to produce and lost their superconducting capability in strong magnetic fields like those generated by motors. More promising have been wires made from YBCO (yttrium, barium, copper and oxygen), which are more resistant to magnetic fields, although in previous experiments, scientists have found that making YBCO wires was not without its hiccups. When grown just a little more than a micrometer thick, they fall prey to imperfections that undermine their superconductivity. They can also lose this ability in the presence of strong magnetic fields, which spawn small whirlpools of supercurrents, like tiny electrical tornados. Those whirlpools, or vortices, are of particular interest to Dr. Thompson and his colleagues at Oak Ridge National Laboratory. They found they could immobilize these magnetic vortices by adding barium zirconate to the YBCO they used to make the wires. What's so encouraging is that the vortices held steady even when faced with high magnetic fields and the wires passed the requirements for a wide range of electrical applications, including motors and power cables.

The article: [High-Performance High-Tc Superconducting Wires](#) (*Science*, March 31, 2006)