on board now, the ambitious timetable laid out for the new institute calls for hiring 15 to 25 research staff in the first 100 days and 100 researchers by the end of the first year. "The goal is to put together a collection of individual scientists who have an interest in as quickly as possible moving from targets to treatments," he says. The institute will initially focus on melanoma and pancreatic cancer and then expand to other diseases, including diabetes.

Francis Collins, director of NHGRI, says, "The opportunities in translational research are incredibly broad right now, and entities such as TGRI will play a critical role in that future." –MARI N. JENSEN

Mari N. Jensen is a science writer in Tucson, Arizona.

CONDENSED-MATTER PHYSICS

Spintronics Innovation Bids to Bolster Bits

By just about any measure, technologists pushing to cram more data onto computers' magnetic hard disks have been on a roll. Over the past 4 decades, companies have gone from storing a few thousand bits of data per square inch of disk space (the standard industry measure) to tens of billions of bits in the same space today. That's driven the cost of storing each bit down by orders of magnitude, savings that have fueled the explosive growth of the Web, among other things. Now, a team of researchers at the State University of New York, Buffalo, reports an innovation that could keep the data-density gains rolling in for years to come.

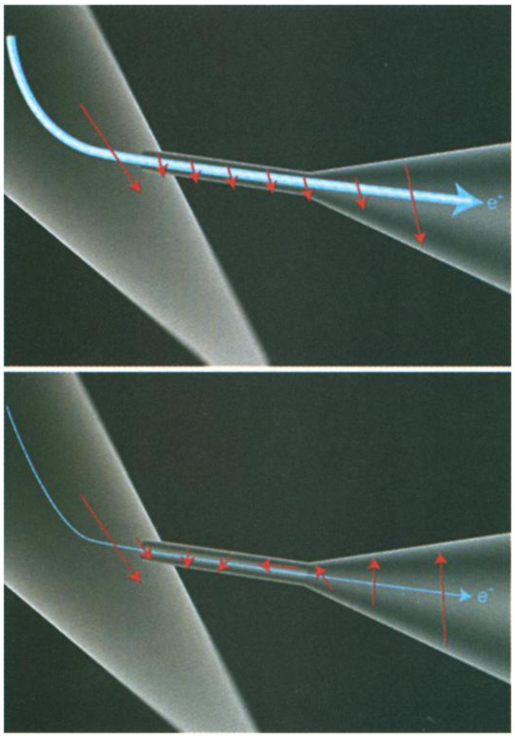
In the 1 July issue of *Physical Review B*, materials scientists Harsh Deep Chopra and Susan Hua report passing electrons through a cluster of magnetic atoms that bridge two magnetic wires. When the magnetic orientation of those electrons, also known as their spin, is the same as the magnetic orientation of the two wires, the electrons travel effortlessly through the cluster, a phenomenon known as ballistic magnetoresistance (BMR). But when the magnetic orientations of the wires point in opposite directions, electrons moving through the cluster from one wire to the other must quickly flip their spin. Because that's hard to do in the nanosized clusters, Chopra and Hua found that the measured electrical resistance jumped over 3000%, the largest such effect ever seen (see figure).

A related effect, known as giant magnetoresistance, forms the basis for the magnetic read heads found in nearly all computer hard-disk drives. As a read head moves above bits of magnetic data, changes in the magnetic orientation of those bits alters the electrical resistance of electrons flowing through the sensor, translating the magnetic data into a stream of electrical pulses.

Those changes in magnetic orientation produce only about a 100% change in resistance in the read head. The larger BMR effect could lead to smaller and more sensitive read heads capable of reading smaller magnetic bits. And that, in turn, could allow diskmakers to boost the storage density of disk drives to a staggering 1 trillion bits per square inch.

"This is a great discovery," says William Egelhoff Jr., a physical chemist at the National Institute of Standards and Technology in Gaithersburg, Maryland. "It's exactly what the disk-drive industry needs if it wants to maintain the growth rates in data-storage density."

Chopra and Hua weren't the first to spot BMR. Nicolás García and colleagues at the Consejo Superior de Investigaciones Científicas in Madrid, Spain, first described the effect in 1999. At the time, they saw only a 200% change in resistance, a number they have subsequently raised to 700%. García's team produced the effect by positioning two magnetic wires close to each other in the shape of a "T." They then used standard techniques to deposit magnetic atoms from a solution, forming a nanobridge between the two wires. Egelhoff says that García's team has done beautiful work in demonstrating the effect, but he says that their technique for making the bridges is "somewhat crude."



Tough going. Electrons breeze between two wires with the same magnetic orientation (*top*) but face resistance when the orientation of one is reversed (*bottom*).

That's where Chopra and Hua come in. Before depositing the metal bridge, they sharpened the tip of the wire, bisecting the top portion of the "T" to form an ultrafine point just 40 nanometers across. That allowed the bridge to meet the wire at a single, well-formed contact. Just why that should produce a higher magnetoresistance effect remains unclear, however.

Whatever the mechanism, Egelhoff notes that there is still a long way to go before the effect has a shot at revolutionizing data storage. Most important, he says, researchers must still learn to harness BMR to create magnetic read-head sensors. He is collaborating with García's team on the initial steps needed to do just that, a goal that Chopra's team is pursuing as well. If successful, the technique could extend conventional disk-drive technologies to storage densities that some labs are pursuing by much riskier, more exotic approaches. –ROBERT F. SERVICE

MALARIA

Ecologists See Flaws in Transgenic Mosquito

WAGENINGEN, THE NETHERLANDS—If a small band of molecular biologists has its way, the next few years might bring field tests of "designer mosquitoes," genetically modified so that they are unable to transmit diseases such as malaria. The goal would be to replace the natural mosquito populations ravaging developing countries. But at a workshop here last week,* 20 of the world's leading mosquito ecologists said, "Not so fast." Although lab science might be thriving, they said, huge ecological questions remain—and it's time funding agencies, which have enthusiastically endorsed the transgenic mosquito plan, started devoting attention and money to answering them.

Gathering in this Dutch university town, the group outlined a sweeping ecological research agenda, ranging from baseline population genetics to an emergency plan in case the transgenic critters run amok. Many of these issues have been deferred or overlooked by the molecular biologists developing the disease-fighting mosquitoes, said meeting organizer Thomas Scott of the University of California, Davis.

At least five U.S. and three European research groups are working on transgenic mosquitoes, with support from the U.S. National Institute of Allergy and Infectious Diseases (NIAID), the World Health Organization (WHO), and the MacArthur Foundation. After a slow start, the field took off

* "The Ecology of Transgenic Mosquitoes," Wageningen University and Research Centre, 26–29 June.

ILLUSTRATION: C. SLAYDEN