

Areas to Watch in 2006

Avian flu. Whether or not a pandemic kicks off in 2006, research on flu vaccines and drugs will expand—as will debates on who should get them first should a pandemic occur. Also look for a wealth of data on the molecular biology, evolution, epidemiology, and even the history of influenza. And keep your fingers crossed.

Gravity rules. After years of refinements, the first phase of the Laser Interferometer Gravitational-Wave Observatory (LIGO) has reached its promised sensitivity. LIGO's laser chambers in Louisiana and Washington state will monitor the sky during most of 2006—with a smaller facility in Germany, called GEO-600, joining the network later in the year. If two neutron stars merge within 50 million light-years or so, the devices could detect the death spiral. It's a long shot, but we're betting they will.

RNAi-based treatments. They're moving into human patients with startling speed, and 2006 should offer the first hints of how well the highly touted technique works. Company-funded trials in macular degeneration and the pediatric illness respiratory syncytial virus are under way; another targeting hepatitis C is supposed to launch soon, with some therapies for neurological diseases to follow. Oh, and another treatment that's coming down the pike: RNAi for permanent hair removal.

Catching rays. The speediest atomic nuclei in the universe, called ultrahigh-energy cosmic rays, may open a new frontier of physics. The sprawling Pierre Auger Observatory in Argentina will near completion in 2006, offering the best chance to explore those limits. Already, Auger's powerful combination of ultraviolet telescopes and water-tank detectors is measuring different aspects of the particle showers sparked by incoming rays. Early results affirm a theorized energy threshold, imposed by interactions in space, that cosmic rays rarely cross.

Small worlds. With ever-better methods of pulling DNA from environments such as soils and the human gut, researchers are documenting the incredible microbial diversity on this planet. In 2006, expect a flurry of papers detailing the evolution and molecular bases of microbial communities and the relationships, both beneficial and pathogenic, between microbes and their partners; more examples of lateral transfer of genes between species; and—just possibly—consensus about a microbial family tree and a much sharper picture of how eukaryotic cells arose.

Seconding supersolidity. Two years ago, physicists reported that solidified helium appears to flow like a liquid without any viscosity. Theorists debate whether such "superflow" is possible in a well-ordered crystal, and no one has reproduced the result yet. Look for someone to confirm the observation—or shoot it down.

Homing in on high- T_c . In 1986, physicists discovered that certain compounds laden with copper and oxygen carry electricity without resistance, some now at temperatures as high as 138 kelvin. Twenty years later, researchers still aren't sure precisely how high- T_c superconductors work. But a variety of exquisitely sensitive experimental techniques should cull the vast herd of possible explanations.



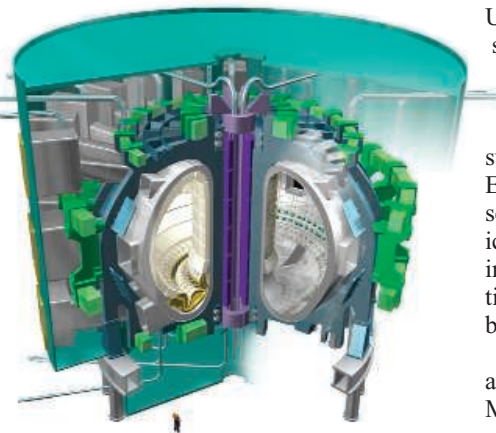
Now you see it? A fleeting glimpse captured on video raised hopes that the ivory-billed woodpecker might not be extinct after all.

Bird to watch for. Early in 2005, a blurry video and new sightings of the ivory-billed woodpecker, considered extinct for the past 60 years, wowed conservationists and birders alike. Some skeptics remained unconvinced by the 1.2-second footage, but many later were swayed by audio tapes of the woodpecker's call and distinctive "tap, tap." Biologists are scouring the Arkansas bayou, where there have now been more than a dozen sightings, for more evidence that they are not seeing a ghost of a bird past. We're betting this "ghost" proves to be the real thing.

project in 1999, only to rejoin in 2003. By late 2003, only one hurdle remained: choosing the site. Government ministers from the by-then six members—China, the European Union (E.U.), Japan, South Korea, Russia, and the United States—gathered in Washington, D.C., for a gala signing ceremony. But when the time came to vote, they split down the middle.

More technical studies of the two sites were carried out, but both sides dug in their heels. Rumors of political skullduggery abounded: Europeans suspected that the

Closing the circle. After 20 years of research, fusion scientists are ready to start building the ITER reactor.



United States refused to support the French site to punish France for opposing the war in Iraq, while other whispers suggested that the United States had backed the Japanese site in exchange for Japan's support for the war. In the end, Japan and the E.U. hammered out a deal between themselves. In June this year, after months of delicate diplomacy, Japan withdrew Rokkasho in exchange for a bigger share of construction contracts and a hefty European contribution to a fusion research facility in Japan.

Now ITER researchers can look forward to a few decades working under the warm Mediterranean sun. And who knows? The world may get a working fusion reactor at last.

—THE NEWS STAFF