



### FUSION RESEARCH

## ITER Finds a Home—With a Whopping Mortgage

After a year and a half of tense diplomacy and secret discussions, an international fusion research collaboration has finally chosen a site for the world's most expensive science experiment. Meeting in Moscow this week, ministers from China, the European Union (E.U.), Japan, Russia, South Korea, and the United States announced that Cadarache, in southern France, has been chosen as the location of the International Thermonuclear Experimental Reactor (ITER).

"I'm extremely pleased," says Jean Jacquinot, former head of the Cadarache, fusion lab and now science adviser to France's high commissioner for atomic energy, "not because it is Cadarache, but because the whole community can now get together and build something."

Japan, after standing firm against foreign opposition, in the end may have surrendered to internal pressure to give up its desire to be ITER's host. Observers speculate that the Ministry of Finance, seeking to rein in Japan's deficit spending, may have balked at

the price tag, about \$2.5 billion for the host country. In return for the withdrawal of the Japanese site, companies in Japan will get substantial E.U. procurement contracts, and European money will help build a major



**Joining forces.** The E.U.'s Jabez Potočnik (left) helps Japan's Nariaki Nakayama sign on the dotted line in Moscow.

research center in Japan. The choice of Cadarache "is disappointing," says plasma physicist Kenro Miyamoto, a professor emeritus at the University of Tokyo, "but it's preferable to having the project fall apart."

ITER aims to recreate the sun's power on Earth. Using intense magnetic fields to hold

hydrogen isotopes at enormous temperature and pressure, it would produce a flood of energy as the isotopes fuse to form larger nuclei. Originally proposed at a U.S.-Soviet summit in 1985, the ITER design was essentially complete in 2001, but when the six partners gathered in Washington, D.C., in December 2003 to pick between two candidate sites, South Korea and the United States supported Rokkasho in northern Japan, whereas Russia and China backed the E.U.'s candidate at Cadarache (*Science*, 2 January 2004, p. 22).

Further technical studies failed to resolve the impasse. Some Europeans accused U.S. officials of favoring Japan because, unlike France, it had supported the U.S.-led invasion of Iraq. The logjam began to move in April this year when E.U. research commissioner Jabez Potočnik visited Tokyo; negotiations continued during a visit by Japanese Prime Minister Junichiro Koizumi to Luxembourg in May. The two rivals for host agreed on a deal guaranteeing certain concessions to the loser (*Science*, 13 May, p. 934). All that remained was for one side to back down. This week, Japan graciously removed Rokkasho from the running.

As expected, the E.U. will pay for 50% of ITER's \$5 billion construction price tag. The other five partners will contribute 10% each ▶

### SPACE SCIENCE

## Solar-Sail Enthusiasts Say Mission Lost, Possibly in Space

Cosmos 1, a privately funded spacecraft that aimed to demonstrate solar sailing for the first time, appears never to have had a chance to unfurl its sails. But staff from the Pasadena, California-based Planetary Society, the nonprofit organization running the project, say tantalizing messages ground controllers received shortly after the craft's launch on 21 June hint that it might have made it into orbit. "We're hanging in there," says project director Louis Friedman. "But it's an increasingly dim hope."

Officials from the Russian Space Agency (RKA), which launched the spacecraft on board a converted ICBM from a submarine in the Barents Sea, believe the rocket's first stage

failed, causing launcher and payload to crash into the sea. The plan was for the Volna rocket to lift Cosmos 1 into an 825-kilometer-high orbit. There researchers would have inflated booms to spread eight solar sails made of ultralight reflective Mylar, designed to show that the pressure of sunlight could slowly push Cosmos 1 into a higher orbit. The main space agencies hope to use solar sails to reach parts of the solar system inaccessible to chemical rockets (*Science*, 17 June, p. 1737). An earlier demonstration by the Planetary Society, also called Cosmos 1, failed on launch in 2001.

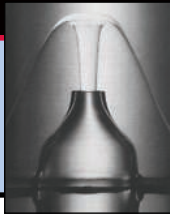
Although RKA's launch telemetry suggested a booster failure, some tracking stations along the planned orbit picked up sig-

nals that seemed to come from Cosmos 1. Researchers from Russia's Space Research Institute in Moscow continue to listen for the craft and are sending commands to turn on its transmitter. Even if Cosmos 1 did reach space, Friedman says, "it would be in a very low orbit and probably decayed quickly." Still, Friedman says, "it would be nice to know the spacecraft worked."

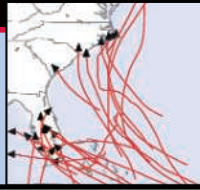
Friedman says the Planetary Society is talking to the mission's main sponsor, the entertainment company Cosmos Studios, and others about mounting another attempt. "We can still advance this whole thing," he says. But after two failed attempts, "we'll never use a Volna again." —DANIEL CLERY

CREDIT: IVAN SEKRETEV/AP PHOTO

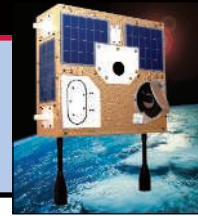
**38**  
Helium goes with the flow



**41**  
The pulse of the Gulf Stream



**43**  
The humble space telescope



as payments in kind. As a consolation to Japan, the E.U. will place some of its industrial contracts with Japanese companies so that Japan will end up building 20% of the reactor. Japanese researchers will make up 20% of the staff of the ITER organization, and the E.U. agreed to support a Japanese candidate for director general. Some headquarters functions will also be sited in Japan, and the E.U. promised to back Japan as a host for any subsequent commercial prototype reactor.

Japan will also get to host an extra research center to speed work toward commercial fusion reactors. Japan can choose from a list, drawn up by the six partners, that features a high-energy neutron source for materials testing, a fusion technology center, a computer simulation lab, and an upgrade of Japan's existing JT-60 fusion reactor. To pay for the center, the E.U. and Japan will

contribute up to \$800 million more than the normal ITER budget. "Japan will serve as what you could call a quasi-host country for the ITER project," Japan's science minister, Nariaki Nakayama, told a press conference today. "Through the [extra facility], we will become a base for international research and development in fusion energy equal in importance to the E.U."

Other partners, particularly South Korea and China, are less enamored with the deal. Luo Delong, an official with China's Ministry of Science and Technology, says that "more discussion is needed on the issues of the ITER director and the additional research facility."

European fusion researchers are delighted with the result. "Everyone is very happy," says Alex Bradshaw, scientific director of the Max Planck Institute for Plasma Physics in Garching/Greifswald, Germany, and chair of Ger-

many's fusion research program. But some researchers are wondering whether, considering the final deal, it wouldn't have been better to be the loser—especially because France seems to be getting the whole pie, with slim pickings for other E.U. countries. There are also worries that little will be left for fusion research supporting ITER if the European research budget shrinks (*Science*, 24 June, p. 1848). "It is essential to keep other activities going, or no one from Europe will be around to use ITER" in 10 years' time, says Bradshaw.

For now, however, there's a palpable sense of relief after 18 months of wrangling. "I will certainly be quite happy to share a glass with my European colleagues," says France's Jacquinot.

—DANIEL CLERY AND DENNIS NORMILE

With reporting by GongYidong of *China Features* in Beijing and Andrey Allakhverdov in Moscow.

## U.S. BUDGET

# House 'Peer Review' Kills Two NIH Grants

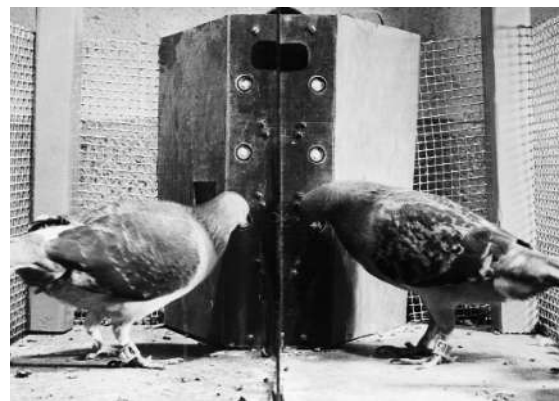
For the second year in a row, the House of Representatives has voted to cancel two federally funded psychology grants. A last-minute amendment to a spending bill would bar the National Institutes of Health (NIH) from giving any money in 2006 to the projects, one a study of marriage and the other research on visual perception in pigeons. The grants total \$644,000 a year and are scheduled to run until 2008 and 2009.

The amendment was offered by Representative Randy Neugebauer (R-TX), who last year won a similar victory involving two other grants, although his efforts were later rejected in a conference with the Senate. Researchers are hoping the Senate will come to the rescue again this year.

Neugebauer says that he is correcting skewed priorities at the National Institute of Mental Health (NIMH), in particular, the institute's "fail[ure] to give a high priority to research on serious mental illnesses." But NIH officials and scientific societies say he's meddling in a grantsmaking process that is the envy of the world. In a statement before the vote, NIH Director Elias Zerhouni called the amendment "unjustified scientific censorship which undermines the historical strength of American science."

Some House Republicans have been scrutinizing NIH's portfolio for the last few years and in 2003 almost killed several grants

studying sexual behavior. Neugebauer's concerns echo the arguments of longtime NIMH critic E. Fuller Torrey, a psychiatrist who contends that the agency should spend more on diseases such as depression and schizophrenia. Last year's vote was aimed at two NIMH psychology grants that had already



**For the birds?** House lawmakers nixed a grant on perception research involving pigeons, long used in studies such as this B. F. Skinner experiment on operant conditioning.

ended, so the effect would have been symbolic (*Science*, 17 September 2004, p. 1688).

This year, the vote could have a real impact, and it came as a rude shock to the two principal investigators involved. "I'm disappointed that peer review is being under-

mined," says Sandra Murray of the University at Buffalo in New York, who received \$345,161 from NIMH in 2005 and is expecting an equivalent amount each year through early 2009. Murray has so far enrolled 120 newlywed couples—the target is 225—in a study of factors that contribute to stable marriage and to divorce, which, she notes, "has a huge societal cost." Her study will also look at mental illnesses, she says. Neugebauer says funds for "research on happiness" would be better spent on new treatments for depression.

The second grant, to Edward Wasserman of the University of Iowa in Iowa City, continues his 14-year investigation of visual perception and cognition in pigeons. The study, slated to receive \$298,688 a year through mid-2008, sheds light on "how the human brain works" and could help develop therapies for mental and developmental disorders, Wasserman says. Neugebauer,

however, questions whether it "would have any value for understanding mental illnesses."

The American Psychological Association and the Association of American Medical Colleges were part of a coalition that tried last week to quash the amendment, sending a ▶