perimental Reactor (ITER) fusion project, and pursue a proposal to develop a patent that would be valid across the EU.

As the head of the EU's research directorate, Busquin, 58, will administer the 4-year, $17 billion Fifth Framework research program and plan its successor. Although he has focused on politics for the past 2 decades, he started his career in science. He received a physics degree from the Free University of Brussels in 1962 and was an assistant physics lecturer on the university's medical faculty from 1962 to 1977. In 1976, he studied ecology and environmental issues at the Free University, and from 1978 to 1980 he chaired the board of directors of Belgium's Institute of Radioelements. He later rose to political prominence as the leader of the Socialist Party in Belgium's French-speaking region. Along with his new colleagues, Busquin will be taking office 4 months early, because the former commission resigned en masse last spring in response to allegations of cronyism and mismanagement (*Science*, 19 March, p. 1827).

In written and oral answers to the MEPs' questions, Busquin expressed support for the JRC but made it clear that he wants to make some changes. The JRC was set up as a nuclear research center 40 years ago but has since grown to include institutes covering fields from space applications to consumer protection. Europe's current concern over food safety shows that a body like the JRC is needed, he said, but the JRC "should play a more structured role" in supporting EU policy-making. The JRC's director-general, Herbert Allgeier, told *Science* that he was impressed with Busquin's knowledge and interests: "He has studied physics, he is a good listener, and he has an energetic approach."

As for intellectual property issues, Busquin noted that "the patent system in Europe is cumbersome and complex. The cost of a patent is on average four times higher in Europe than in the U.S., and the current European patent does not automatically guarantee protection in all member states." He said he favors the introduction of a "Community patent" to grant protection across the EU.

Italian MEP Guido Bodrato also quizzed Busquin about the EU's involvement in ITER. The United States pulled out last year, but the EU remains a partner in the project, along with Russia and Japan. A decision on the EU's participation "can only be taken in the context of the next nuclear research program," Busquin said, indicating some qualms about a recent proposal to scale ITER down to a smaller machine. "The laws of physics require the construction of relatively large facilities in order to study conditions in a future fusion reactor." Busquin called for further debate on the future of EU fusion research.

The harshest questioning during his appearance before the Parliament's research committee concerned his qualifications for the post and his ability to administer public funds. Critics asked whether—in the wake of the cronyism and mismanagement allegations that plagued his predecessor, Edith Cresson—Busquin's authority would be compromised by past financial scandals involving Belgium's Socialist Party. Busquin denied any involvement in those scandals and offered to resign if Prodi asked him to do so. In the end, the parliamentary panel neither endorsed nor opposed his nomination.

The chair of the research committee, Spanish Socialist Carlos Westendorp, reported after the hearing that some members "doubted both Mr. Busquin's future capability to perform as research commissioner, and his leadership capacity to restructure and reform" the research directorate. However, Westendorp added that "many others found him to be adequate, conscientious, and familiar with the research world." –ROBERT KOENIG

BIOTECHNOLOGY

Wellcome Seeks New Home for Business Park

"WANTED: Huge biomedical research charity seeks 40,000 square meters of empty space for biotech business park. Proximity to world-class genome research center would be an advantage. $160 million available to spend on development. Offers from anywhere in the world will be considered."

After being refused planning permission by the local council to build facilities in which biotech companies would rub shoulders with researchers at its Genome Campus, Britain's Wellcome Trust is looking for an alternative venue. And, to the consternation of the U.K. biotech industry, the trust will consider sites overseas, which trust director Mike Dexter says is not an empty threat. That possibility has touched off a furor. John Sime, director of the BioIndustry Association, a trade body representing small and medium-sized bioscience companies, says, "If Wellcome decided to go overseas, it would be a tragedy. Towns like Munich, Rotterdam, and Lyons [all vigorously wooing biotech companies] must be laughing themselves silly."

The site search follows a decision last month by John Prescott, minister for the environment, transport, and the regions, to uphold the decision of the South Cambridgeshire District Council to deny the trust, after a 2-year battle, the permission it needs to develop land next to its Genome Campus at Hinxton near Cambridge. The council argues that the local infrastructure could not support the 1000 new jobs created by the 40,000-square-meter facility, which would house start-up companies and R&D offshoots of larger pharmaceutical firms. It suggested that the trust could use one of several existing science parks elsewhere in Cambridgeshire or, if that were unacceptable, build a smaller, 24,000-square-meter facility that would house only new spin-off companies.

Both suggestions miss the point, says Dexter. The trust wants to tap into the intellectual powerhouse of the Genome Campus, comprising Wellcome's sequencing facility, the Sanger Centre, as well as the European Bioinformatics Institute and the government's Human Genome Mapping Project Resource Centre. "It is important," says Dexter, "to have daily, face-to-face interactions and for spin-off companies to learn from established, successful firms."

The trust also hoped that the site might benefit from the SNP Consortium of major pharmaceutical companies which, with backing from Wellcome, is trying to identify genetic markers (single nucleotide polymorphisms, or SNPs) that will give medical researchers an idea of how effective a medicine will be for each individual. This "not-for-profit" $45 million effort is taking place at the Sanger Centre and three other major research centers in the United States. For these reasons, a site elsewhere in Cambridge or a smaller site that excluded established firms would not be commercially viable, says Dexter. So last week, the trust decided that if it could not establish a

Ivory silo? The Wellcome Trust's Genome Campus seems destined to remain in splendid, rural isolation.

CREDIT: WELLCOME TRUST

biotech melting pot to exploit its own genome center, it would consider a site near a different research powerhouse.

Ironically, Wellcome's tribulations at Hinxton come at a time when the U.K. government is promoting the biosciences as critical for the country's economic well-being and employment prospects. The Department of Trade and Industry, for example, is encouraging companies to gather together into biotech "clusters" similar to those in Maryland, North Carolina, and around the Massachusetts Institute of Technology. Urban geographer Alan Wilson of the University of Leeds says updating Britain's dusty planning regulations is crucial for biotech's development. Wilson is part of a team working with Science Minister David Sainsbury to identify ways in which government can help the biotech sector. "It is a shame that these issues are polarized as single planning questions, such as can the village stand an extra thousand houses," he says.

Dexter says he is still trying to arrange a meeting with the council. In the meantime, several cities—both in the United Kingdom and overseas—are eager to attract the prestige and money of the Wellcome Trust and have submitted proposals that the trust is evaluating. "Think about the major genome sequencing centers around the world," says Dexter. "There are some attractive overseas options."

–HELEN GAVAGHAN

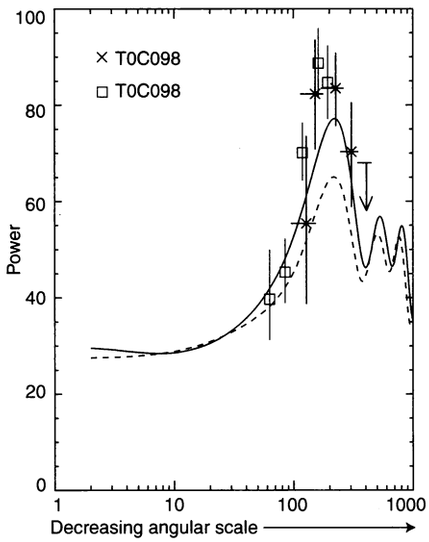
Helen Gavaghan writes from Hebden Bridge, U.K.

COSMOLOGY

Firming Up the Case For a Flat Cosmos

Doing research in modern cosmology is a bit like watching the game show *Wheel of Fortune*. At the beginning, the hidden phrase is impossible to guess, but as Vanna White turns over each letter the answer suddenly becomes blindingly obvious. A long-sought hump in measurements of the universe's faint background radiation, for example, was no more than a hint in earlier observations, but now a telescope high in the Chilean Andes has opened a clear view of it. The discovery, which will be reported in the 10 October *Astrophysical Journal Letters*, confirms a long-standing prediction about the universe's total mass and energy density and hints that a major part of the total may be a mysterious form of energy in empty space.

The "hump" actually measures the coarseness of the ripples imprinted on the cosmic microwave background (CMB) shortly after the big bang. In its first 100,000 years or so, the baby universe was so dense and hot that matter and light behaved like a single fluid, so that fluctuations in the density of the ionized gas created corresponding hot and cold spots in the radiation. But as the universe expanded and the gas cooled, light broke free, or decoupled, from matter. A fossil record of the fluctuations at the time of the decoupling can be seen even today, imprinted on the CMB.



SOURCE: MILLER ET AL.

Peak of interest. New measurements from Cerro Toco in Chile reveal the angular size at which cosmic-background fluctuations are most common.

Because cosmologists can calculate the actual size of the most common ripples, their apparent size in the sky reflects the overall shape of space, just as the apparent size of objects seen through a lens depends on the shape of the glass. By measuring the angle at which the fluctuations are most common—the "hump"—cosmologists can trace the geometry of the universe, which is determined by the total amount of energy and matter it contains. Theorists' favorite picture of the big bang implies that the universe contains just enough matter and energy to retain a flat geometry, in which parallel lines always remain parallel, rather than diverging or converging, as they would in "open" or "closed" universes. In a flat universe the hump would fall at an angular size of about 1 degree.

Finding the hump has proved difficult, however, because it requires extremely precise comparisons of the CMB's temperature at different points in the sky. A first glimpse came from two experiments done last year at the South Pole, Viper and Python. Viper showed that the abundance of ripples seemed to increase from 1/6 of a degree up to 1 degree; Python showed it falling on scales larger than 1 degree (*Science*, 1 January, p. 21). But no single experiment covered the entire hump, and cosmologists were concerned that they might be forcing mismatched pieces of the puzzle together. "There are always calibration issues" when the results of different experiments are combined, says Princeton University astrophysicist Amber Miller.

The new measurements by the Microwave Anisotropy Telescope (MAT) team, a collaboration led by Lyman Page of Princeton and Michael Devlin of the University of Pennsylvania, seem to have put that concern to rest. Observing from a dedicated 85-centimeter telescope perched high on the southern slopes of Cerro Toco in northern Chile, the MAT team compared the CMB at different spots in the sky for almost 1200 hours. They found that the abundance of ripples clearly "rises and then falls" near 1 degree, says Miller.

"All by itself it shows the existence" of the 1-degree hump, says University of Chicago cosmologist Michael Turner. He says it will take the Microwave Anisotropy Probe satellite, to be launched in fall 2000, to reveal the precise shape and position of the hump. But already, Turner says, "we can claim to have a complete accounting of the matter and energy in the universe."

If so, the universe that astronomers can see is seriously underweight. Simply counting up all of its stars, gas, and hidden "dark matter," astronomers have found only 30% of the critical density needed to flatten it. Theorists speculate that the rest takes the form of a cosmological constant first proposed by Einstein, an energy in empty space that pushes on the fabric of space-time. Its effects may already have been spotted in observations of distant exploding stars, or supernovae, which appear to show that the expansion of the universe is accelerating (*Science*, 18 December 1998, p. 2156), says Saul Perlmutter of Lawrence Berkeley National Laboratory in California.

Happily, the supernova observations point to a cosmological constant that accounts for nearly 70% of the critical density, just enough to make up the deficit. The consistency of the two results is "nudging us from having to believe [in the cosmological constant] to being able to measure it," says Harvard University astrophysicist Robert Kirshner.

–MARK SINCELL

Mark Sincell is a science writer in Houston.

LASER FUSION

A Less Powerful NIF Will Still Cost More

The managers of a giant laser project have proposed drastically shrinking the National Ignition Facility (NIF) to curb rising costs, a step that could reduce its chances of achieving an important scientific goal in fusion research. But the downsizing will not elimi-