

SPACE SCIENCE

A Focal Point for Diverse Disciplines

Thanks to the persistence of a Swiss physicist and his political allies, space scientists are about to get their own institute devoted to stitching together the field's scattered disciplines. The new International Space Science Institute, located in Bern, the Swiss capital, will be inaugurated on 6 November, when it plays host to its first event: a workshop on the outer reaches of the solar system, where particles streaming from the sun meet the interstellar medium.

The institute offers "a place to compare notes among disciplines," says its founder and co-director, Johannes Geiss. It also provides a much-needed venue for scientists of different nationalities to meet, space scientists say. And for the European Space Agency (ESA)—which is funding half the organization's \$1.5 million annual costs—it provides an opportunity to say thank you to Switzerland, which lacks any ESA facility but has been consistently supportive of its space projects, according to ESA officials.

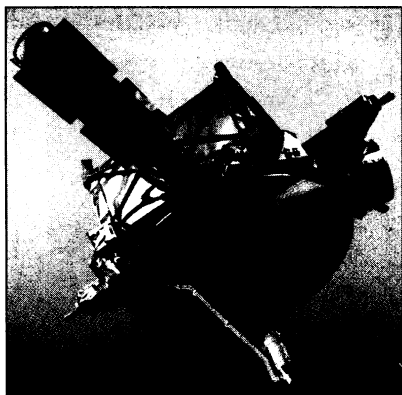
The new institute will concentrate on data gathered by international missions studying the physics of the sun, the solar wind, and other space plasmas, interactions between the sun and Earth, and comets, says Geiss. ESA scientists have focused on such research rather than the planetary science that is the mainstay of the U.S. and Russian programs.

The institute will have fewer than a dozen scientists and support staff, but by bringing in visiting researchers, Geiss and his colleagues intend to organize study groups and workshops of up to 40 theoreticians and experimentalists. The emphasis will be on sifting through the huge amounts of data from these missions that remain largely unexplored. "There are so many open questions left; the challenge is to organize them and find the time to explore them," says Geiss, who teaches at the University of Bern and participated in the Ulysses mission.

The institute will not duplicate work now done by ESA, says Martin Huber, who directs ESA's space science department. "It will do pure research based on satellite data and will not be involved with operations and planning," he says. Bringing together the different disciplines will provide great synergy, Huber adds.

The 5-day November workshop will bring together astronomers familiar with the

heliosphere, a region dominated by the solar wind that extends 100 astronomical units from the sun, and physicists who have been gathering data on the effects of the sun around Earth. Western European, American, Russian, Polish,



Data factory. Institute will analyze data from missions like Ulysses.

and Japanese scientists will participate in the effort. The response to the workshop has been enthusiastic, says Geiss, who will co-direct the institute with Bengt Hultqvist, former director of the Swedish Institute of Space Research in Kiruna: "Only one person didn't accept who was invited, and he has health problems."

The enthusiasm is no surprise to Geiss: He received lots of encouragement for his idea from a diverse group of scientists, ranging from Roald Sagdeev, former chief of the Soviet Union's space science program, to Reimar Luest, former

ESA director general. Finding the money, however, was not so easy.

ESA science managers at first balked at participating, given the tight squeeze on funding. But, thanks to lobbying from Swiss politicians such as Peter Criolla, who heads that country's ESA delegation, the Paris-based ESA agreed in December to support the proposed institute. The governments of Switzerland and the canton of Bern will kick in half the required funding. The Swiss aerospace company Contraves, which helps build part of the European Ariane rocket, also stepped in to provide some endowment money.

In addition to supporting the small staff, the money will finance visits to the facility primarily from European space scientists. "We feel at this point that financing Europeans is our priority," says Geiss, although he adds that others are welcome. The institute is unlikely to cover travel costs for non-Europeans, but the Swiss National Science Foundation has an international account that they could turn to for support.

If the upcoming workshop proves a success, Geiss says he hopes it will set the pattern for future efforts. "We are trying to play the role of an institute of advanced studies—but, of course, Princeton already is using that name."

—Andrew Lawler

NATIONAL LABORATORIES

Los Alamos Wins One in Tritium Race

Adopting what Energy Secretary Hazel O'Leary calls "the old belt-and-suspenders approach," the Department of Energy (DOE) has settled on a two-track strategy for making tritium for the United States' nuclear arsenal. DOE will recommend that Congress allocate \$45 million in fiscal year 1996 for a multiyear study of the feasibility of making the radioactive isotope in an advanced proton accelerator. It will also call for another \$5 million to be spent on a parallel track: a study of tritium production in a commercial nuclear power reactor, either leased from a utility or purchased outright.

The announcement, which at press time was scheduled for 10 October, will please officials at Los Alamos National Laboratory, where the bulk of the research and development for a tritium-producing accelerator will be pursued. But it represents a loss for proponents of an alternative approach: building an all-new reactor specifically for making tritium. It will also disappoint scientists who hoped that the accelerator could be explicitly dedicated to making both tritium and beams of neutrons for basic science (*Science*, 18 August, p. 914). "I've got one obligation, and that's to produce tritium" for defense purposes, says O'Leary.

Even though the U.S. nuclear stockpile is

shrinking, the supply of tritium—the thermonuclear explosive in a hydrogen bomb—is shrinking even faster. This radioactive isotope of hydrogen, which decays at 5.5% a year, hasn't been produced by the United States in significant quantities since 1988. Even if the government makes the stockpile cuts specified by the still-unratified START-II treaty, new tritium would be needed by 2011. The dual-track approach, says O'Leary, should ensure that DOE won't "get halfway down the path and stop" because of technical or political obstacles.

The accelerator approach poses the chal-



SAM KITTNER

Keeping options open. DOE's Hazel O'Leary.

lence of reliably generating a tightly focused 130-megawatt proton beam—the most powerful ever created by a linear accelerator. The beam would smash into a tungsten target, producing neutrons and other particles that would be slowed in water and sprayed into a gas stream containing helium-3, which the neutrons would convert into tritium. Paul Lisowski, director of the Accelerator Production of Tritium program at Los Alamos, doesn't think the technical challenge is overwhelming: "What we're talking about is building up a system from parts that have already been tested." Counting the 1996 expenditure, DOE is now prepared to spend roughly \$350 million for Los Alamos to build and test a lower energy prototype; a full-scale accelerator would cost in the vicinity of \$2 billion and would probably be located at Savannah River, DOE officials say.

Reactor production of tritium is a more familiar technology: The current tritium stock was produced by bombarding lithium rods with neutrons in the cores of now-defunct reactors at Savannah River. At a total cost of about \$250 million, the reactor studies will look at the safety of running a reactor with a full load of lithium bars and at regulatory issues. The actual cost of purchasing and converting a commercial reactor might be between \$1 and \$2 billion, say DOE sources.

O'Leary believes that the conversion or dual use of a fission reactor would have "the lowest incremental environmental impact," as the reactor would be operating anyway to produce electricity. Still, any reactor produces long-lived radioactive byproducts, and blurring the long-standing distinction between civilian and military plants raises questions "that would need to be resolved at the highest levels of government," says Jon Ventura, a legislative and public affairs specialist for defense programs at DOE. The accelerator, in contrast, would produce no long-lived waste and wouldn't suffer from the public fears surrounding fission reactors.

DOE has decided not to exploit what some scientists see as another strength of the accelerator option, however: the possibility of using it as the world's most intense source of neutron beams for probing materials and molecules. In times of thin funding, says Burton Richter, director of the Stanford Linear Accelerator Center, such dual use would yield "an accelerator for research built on military money."

O'Leary's announcement offers no encouragement to Richter and others who hoped to share the facility. But John Browne, director of the neutron-science center at Los Alamos National Laboratory, offers a small consolation prize. Even if the defense accelerator isn't open to basic researchers, future neutron sources for civilian research "will benefit from the R&D."

—James Glanz

LYME DISEASE

NIH Gears Up to Test a Hotly Disputed Theory

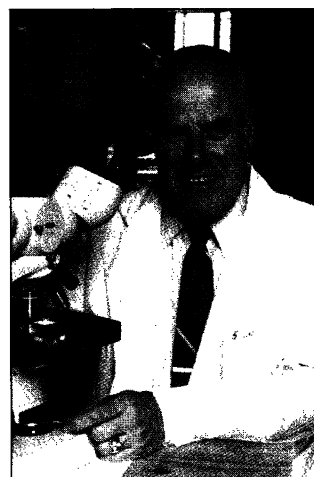
The National Institutes of Health (NIH) is preparing to fund a \$1-million-a-year study that it hopes will settle a dispute that has riven a segment of the medical community in the past few years. At issue: Is there a chronic form of Lyme disease that sometimes persists after conventional antibiotic treatment, inflicting a variety of symptoms such as muscle pain, fatigue, and memory loss on its victims? A group of physicians and patient advocates believes the answer is an emphatic "yes," and they have been agitating for the medical establishment to take them seriously. The upcoming NIH study means that their claims will finally be put to the test. But many Lyme disease researchers are skeptical of the need for this project.

The very existence of the trial is testimony to the persistence of patient advocacy groups. They have lobbied Congress for many years to support research into chronic Lyme symptoms, promoting the need for long-term therapy. Their tactics have angered research leaders such as Allen Steere of Tufts University, who was the first to identify the U.S. Lyme syndrome in the 1970s. The multimillion-dollar trial that NIH is planning, he says, "would never have been funded" through the "normal mechanisms" of investigator-initiated research. But Greg Folkers, a spokesperson for the National Institute of Allergy and Infectious Diseases, says, "This trial has been under discussion for several years"—well before Congress recommended that NIH study new antibacterial strategies.

Steere, Alan Barbour—a microbiologist at the University of Texas, San Antonio—and other researchers believe that there's little evidence to support the notion that there is an epidemic of chronic infection by Lyme disease. Most so-called chronic cases, they believe, are not Lyme disease at all; NIH's study could be a waste of money. But advocate groups—particularly the Lyme Disease Foundation (LDF) of Hartford, Connecticut, which includes physicians who treat Lyme patients—argue that the disease is more elusive, more malignant, and more difficult to treat than academic scientists have ac-



CHARLES W. STRATTON/UNLIMITED



Eponymous spirochete. Willy Burgdorfer and *B. burgdorferi*.

knowledge. They believe that the traditional treatment advocated by physicians at leading medical schools such as Yale, Tufts, and the University of Connecticut—2 to 4 weeks of oral antibiotics and, in rare cases when the central nervous system is infected, 4 weeks of intravenous antibiotics—is in many cases insufficient to wipe out the disease.

Joseph Burrascano Jr., a Long Island physician who specializes in treating Lyme disease and has served as board member of the LDF, argues that more aggressive therapy is often needed.

He prescribes months-long courses of antibiotics for many of his Lyme patients, including intravenous therapy. Kenneth Liegner, a physician in Armonk, New York, has also written that clinicians should expect "a revolution in our conceptualization of this disease." Evidence is mounting, Liegner says, that "subsets of patients" with as-yet-unconfirmed immune system weaknesses do not benefit from routine therapy and may require "prolonged antibiotic treatment."

Patient activists have seized on these arguments and are pushing for studies which they believe will confirm a more radical attack on the disease than has been recommended by the establishment so far. One objective, says patient advocate Kenneth Fordyce, chair of the governor's Lyme disease advisory committee in New Jersey, is to get insurance companies to reimburse patients for antibiotic therapy that lasts longer than the standard 28 days.

Disagreement between the activists and the medical establishment erupted 3 years ago, when abstracts of a dozen papers submitted by clinicians to a Lyme disease conference were rejected by the program committee as lacking in scientific merit. The papers—most of which discussed chronic Lyme cases—were reinstated over the objections of several researchers after patient advocacy groups protested (*Science*, 5 June 1992, p. 1384).

After failing to convince the establish-