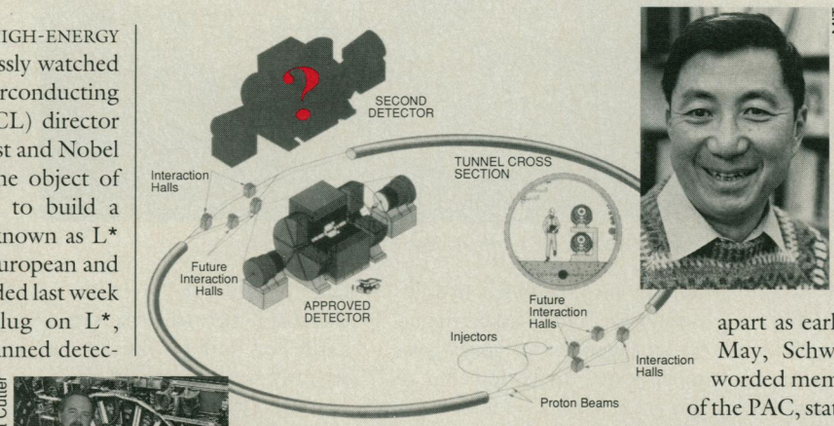
Showdown at the Waxahachie Corral

The SSC management has rejected a controversial detector proposed by Nobel laureate Samuel Ting; its decision reveals just how difficult multinational science can be

FOR ALMOST 4 MONTHS, THE HIGH-ENERGY physics community has breathlessly watched a contest of wills between Superconducting Super Collider Laboratory (SSCL) director Roy Schwitters and MIT physicist and Nobel laureate Samuel C. C. Ting. The object of their struggle: Ting's proposal to build a $760-million particle detector known as L* with a coalition dominated by European and Soviet physicists. The contest ended last week when Schwitters pulled the plug on L*, leaving only one of the two planned detectors in sight for the $8.25-billion SSC and the project's managers wondering how to pick up the pieces (see box below).

L*'s troubles began last January, when the SSC's Program Advisory Committee (PAC) approved a proposal from a collaboration headed by physicist George Trilling of the University of California at Berkeley to build one of the SSC detectors, but sent Ting's proposal for the other back to the drawing board. The committee challenged Ting's cost estimates, asked for stronger U.S. participation in the project—especially in its management—and said it wanted firmer guarantees that foreign contributors would come up with nearly $500 million for L*. Although Ting partially satisfied the PAC's management concerns in March when he asked Barry Barish, a widely respected California Institute of Technology physicist, to chair the collaboration's management board, Schwitters continued to drop hints that he was not satisfied (*Science*, 22 March, p. 1415). Even so, an SSC spokesman expressed confidence as recently as 2 weeks ago that the differences were about to be smoothed over.



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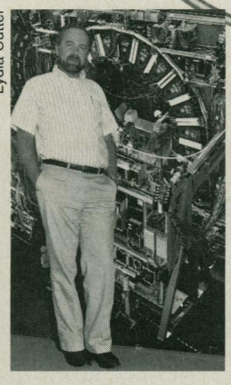
Lydia Cutter

And then there was one. *Roy Schwitters* (left) *pulled the plug on Samuel Ting's proposal, leaving only one detector in prospect for the SSC, now being built near Waxahachie, Texas.*

Such optimism had no basis in reality. The L* collaboration was falling apart as early as March, and on 3 May, Schwitters sent a harshly worded memorandum to members of the PAC, stating that "[t]he leadership of L* has failed to execute some of its most basic responsibilities," including holding the collaboration together and responding "effectively" to the PAC requests. "Since the conditions delineated by the PAC have not been met and since there is no evidence of substantial progress toward meeting them," Schwitters wrote, L* will no longer be considered for the second detector.

How did matters get to this state? Interviews with principal figures in the SSCL management and the L* collaboration, and a review of SSCL decision memoranda and official correspondence obtained by *Science*, reveal a serious perceptual split between laboratory managers and the foreign collaborators in Ting's group. The gulf is so

The Second Detector: Starting From Scratch?

L* may be gone, but the SSC Laboratory (SSCL) has made it clear that it wants another large, multipurpose detector in its place—and soon. The goal will be to devise a detector to complement the Solenoidal Detector Collaboration (SDC), which was approved late last year. But physicists are far from a consensus on just how such a detector should be designed.

Ideally, a detector complementary to the SDC would overlap its capabilities to a fairly large extent—perhaps by as much as 70% to 80%, says Caltech physicist and former L* chairman Barry Barish. The SDC is a "general purpose" detector expressly designed to track large numbers of individual particles as they pass through a strong, centrally generated magnetic field, so a complementary detector might track a smaller set of particles with greater accuracy. L*, in fact, was designed to do just that, using what Barish calls an "offbeat solenoid" with a large, empty central chamber to keep close track of electrons, muons, and photons. SSCL director Roy Schwitters strongly hints in a 3 May memo to an SSC advisory panel that he would like to see the new detector built on the core of L*.

But many physicists are likely to argue for alternative approaches. Michael Marx of the State University of New York at Stony Brook, for example, argues that the new detector should be able to make the same measurements as the SDC in different ways. (Last year, Marx led an unsuccessful attempt to propose an SSC detector that would have emphasized the measurement of particle energy via calorimetry, rather than tracking particles individually.) "When you're looking for the Higgs particle, you're trying to find a few hundred events out of millions every second," he says. "It's like trying to find a few grains of black sand on a white beach." Such arguments will get their first airing at an SSCL workshop in June, in what promises to be an interesting meeting. ■ **D.P.H.**

wide that, even now, the explanations offered by each side for the demise of L* bear little resemblance to one another. In fact, the whole episode could spell trouble for the evolution of Big Science into what some have called Multinational Science (*Science*, 21 December 1990, p. 1648).

The two sides are in agreement on only one basic fact—that the cost and management concerns raised by the PAC and aggressively pursued by Schwitters led the collaboration to unravel. Ting and his European collaborators charge the SSCL with misunderstanding the nature of international collaborations and attempting to force a U.S. structure onto a largely foreign undertaking. "They told us we would not be approved until we accepted a bunch of people we didn't know," says Yuri Galaktionov, a Soviet physicist who has collaborated with Ting for nearly a decade. "That is for us a very strong thing." SSCL associate director for physics research Fred Gilman says simply: "We didn't see how [funding and management problems] could be resolved."

Unhappiness over the management changes requested by the PAC had been putting strains on the L* collaboration for some time when the first cracks became visible. On 13 March, Hans Hofer, head of the Swiss institute ETH-Zürich, wrote to Schwitters and announced his institute's withdrawal from the collaboration. "[Y]ou seem to welcome non-U.S. partners only to share the total L* cost in manpower and financial or in-kind contributions," he wrote. "I cannot imagine that any Swiss physicist would work under such conditions nor make any funds available." Just 2 weeks later, Klaus Lübelsmeyer, director of the I. Physikalisches Institut in Aachen, Germany, followed suit, citing the "completely unacceptable structure of management and organization imposed on us by the SSC Laboratory and the discriminating atmosphere towards European collaborators."

These defections drained L* of nearly 15% of its proposed foreign resources—a serious matter in itself. But the cracks in L* widened into a chasm when Lübelsmeyer repeated his complaints in a 4 April letter to Secretary of Energy James Watkins and Representatives George Brown (D–CA), chairman of the House Science, Space, and Technology Committee, and Tom Bevill (D–AL), chairman of the House appropriations subcommittee that handles the SSC's budget. Within the week, Schwitters and Gilman traveled to Geneva and met with Lübelsmeyer and Hofer, but to no avail. Similarly, Deputy Energy Secretary W. Henson Moore asked Lübelsmeyer to reconsider his decision in a 1 May letter—written just 2 days before Schwitters cancelled L*.

Schwitters apparently blames many of the difficulties on communication problems within the L* collaboration. In his memo to the PAC, he noted that in his Geneva discussions he found "a disturbing amount of incorrect information regarding L* and the SSC...being communicated inside and outside the L* collaboration." Schwitters declined a request for an interview with *Science*.

To Barish, however, the withdrawal of the Swiss and German groups was largely the result of a culture clash between the Old World and the New. American design and cost reviews, he says, are rough sessions in which "you typically get beat up a little bit." Although the demands placed on L* by the PAC and the SSCL looked to Barish like "business as usual," when he traveled to Europe he found that "each review was taken as a personal insult." Hofer and Lübelsmeyer "expected to be courted and thanked for bringing in resources.... It's really a different system there. I don't think the laboratory was treating them badly."

Surprisingly, the person with the least to say about the decision is Ting himself. "I

SSC Savaged by Soundbites

The soundbites were flying thick and fast last week as members of a House oversight subcommittee chaired by Representative Howard Wolpe (D–MI) zeroed in on what they described as "warning signs that portend serious problems" in the design and cost estimates of the Superconducting Super Collider. Wolpe and Representative Sherwood Boehlert (R–NY), a longtime critic of the SSC, both complained that Congress was being asked to fund the project on the strength of flimsy "assurances" from the Department of Energy. At one point, Wolpe cracked, "The way [the SSC] is being presented to Congress, there appear to be only two stages: too soon to tell and too late to stop."

Investigators from the General Accounting Office (GAO), called in by Wolpe to look into the SSC program to build 10,000 superconducting magnets, uncovered enough potential problems, according to Judy England-Joseph, an associate director of GAO's energy issues section, that funds for tunnel construction should be withheld until the lab has successfully tested a string of industry-produced dipole magnets. England-Joseph testified that SSC management has "compressed" its magnet design schedule, overlapping stages of design and construction in a way that leaves no margin for unexpected problems. For instance, although the first full-size prototype dipole magnet won't be finished until November of this year, industrial contractors are scheduled to begin building their first full-size demonstration magnets in June. And 80% of the dipoles will not be tested until they are installed in the accelerator.

Rep. Howard Wolpe (D–MI)

Such objections did not sit well with the DOE representatives called to testify. SSC magnet director Thomas Bush argued that testing 8000 dipoles above ground, for instance, would cost "about $200 million to $300 million more." Instead, Bush said, the SSC has facilities to test the magnets as they're installed in the accelerator ring. Bush also brushed off complaints about the construction schedule, noting that early tests of short dipole prototypes are ahead of schedule and going well.

Wolpe also brought up the issue of cost estimates, accusing DOE of using creative accounting to lowball its cost estimate of $8.25 billion. In a press conference before the hearing, he predicted that the SSC might actually cost as much as $10 billion. Wolpe also questioned DOE's ability to collect foreign contributions, producing an internal DOE status report from October 1990 which concluded that meeting DOE's goal of $1.7 billion in foreign contributions would be "highly unlikely" unless President Bush intervened with the leaders of both Japan and the Soviet Union.

Although the House Science, Space, and Technology Committee, of which Wolpe's subcommittee is a part, has traditionally been supportive of the SSC, Wolpe and Boehlert say they intend to conduct an "ongoing review" of the program. Their next step will be to have GAO probe further the issues of foreign contributions and magnet development. ■ D.P.H.

have no reaction," he said. "I wish I could say I was disappointed, but I'm not." Ting even claimed that he hasn't had time to read Schwitters' memo. Asked if the dispute over the management structure was within his power to resolve, Ting laughed and said, "The problem is not with me, the problem is the foreigners perceiving that they're not welcomed in the management structure by the laboratory."

Some U.S. physicists are praising Schwitters' courage in canceling L*. "This was absolutely the most difficult decision Schwitters had to make," says Michael Marx of the State University of New York at Stony Brook. George Trilling, leader of the approved Solenoidal Detector Collaboration, admitted to mixed feelings about the decision: "I don't want to say we didn't want L*...but we were worried that we might not have enough money to do the things we want to do" if L*'s cost estimates proved optimistic.

Schwitters is now hoping to draw the remnants of L* together with other interested physicists into a new collaboration. Since each major detector must count on no more than $225 million in U.S. support for its initial design, one of the biggest challenges facing the laboratory and the new collaboration is to attract sufficient foreign backing to make a new detector possible. Given the ill feelings over what happened to L*, that's a tall order. ■ DAVID P. HAMILTON

Proposals to Limit Indirect Costs Emerge in Congress

The first solid indication of how Congress might try to fix what is widely perceived on Capitol Hill as the spreading scandal of indirect costs emerged last week. Two proposals to cap portions of the overhead that universities add to research grants began moving through key House subcommittees.

Indirect costs have so far been the flavor-of-the-year on Capitol Hill, ever since Representative John D. Dingell's (D–MI) oversight and investigation subcommittee began uncovering accounting abuses at Stanford University. Congress has launched a multipronged attack on the issue: Dingell continues to lead the way in digging up dirt, and at a hearing last week auditors revealed a new laundry list of questionable charges. On the legislative front, the unlikely team of liberal Henry A. Waxman (D–CA) and conservative William E. Dannemeyer (R–CA) have set the pace with a bill that cleared the health and environment subcommittee last week. It would cap administrative costs (roughly half of all indirect costs) at 26% of modified total direct costs for grants from the National Institutes of Health. Making a run on the outside is Rick Boucher (D–VA), chairman of the House science subcommittee, who is proposing a 45% fixed rate for all indirect costs except depreciation of facilities. Boucher's proposal would apply to all federal grants to universities. And waiting in the warm-up circle are the appropriations committees, with their own ideas about how to reform the indirect cost system.

Everyone, it seems, agrees that reforms are needed. Dingell certainly has no doubts: "For too long, federal research funds have been treated as a cash cow for the universities," he said as he opened a new round of hearings by his subcommittee last week. Federal auditors testified that they have so far found questionable charges at 21 universities. Included in the latest batch: $20,490 for chauffeuring the president of Dartmouth and his wife, a $4,655 contribution to the Museum of Fine Arts by MIT, and $1,000 worth of Steuben Glass wine goblets at Cornell University. Dingell was particularly incensed that Cornell asked for $25,000 to charter aircraft because Cornell president Frank Rhodes was too tall to sit comfortably on commercial airplanes. Dingell, who is 6' 3" himself, did not find this a convincing argument.

Dingell will shortly be doing more on indirect costs than exposing possible abuses. The Waxman/Dannemeyer bill is expected to be taken up by the full Energy and Commerce Committee, which Dingell chairs, sometime later this month. Although a spokesman says Dingell would prefer to hold off on legislation until his investigations determine the size of the problem, public pressure for Congress to take action may force him to move the legislation through his committee. The proposed 26% cap would set a maximum indirect cost rate for administrative costs at what is now the arithmetic average for those costs, so approximately half the universities in the country—mostly private ones—would lose money. Institutions falling below the cap would not receive a windfall: they would still have to justify any higher indirect cost rates than they are charging now. The bill also has a provision that should make scientists smile: If a university is found to be overcharging the government on indirect costs, any money the government recovers, plus interest, would go to "supporting projects of biomedical or behavioral research," in particular by young scientists who have never before served as principal investigators.

Boucher's solution to the indirect cost problem is more sweeping than the Waxman/Dannemeyer proposal and it uses a different approach to curbing abuses. Boucher would set a fixed rate for all universities of 45% of modified total direct costs to cover not only administrative costs but also student services, library expenses, and operation and maintenance. This is also close to the present arithmetic mean for all universities, so approximately half the institutions in the country would suddenly be getting more money from the government, while the rest would get less. The only category exempted from the fixed rate would be building and equipment depreciation; universities would have to justify charges for these items separately. Universities could apply for a 1-year waiver if they felt the 45% figure was too low. Boucher's proposal has not yet been written into legislation, and he is currently looking for cosponsors.

And finally there are the appropriations committees, which are now working on agency budgets for the 1992 fiscal year and are considering their own caps. The agriculture appropriations subcommittees have already demonstrated a willingness to go that route: Last year they applied caps on indirect costs for competitive grants from the Department of Agriculture.

Universities are not thrilled with any of these proposals. "There is no such thing as a legislative solution that's a good idea," complains Carol Scheman of the Association of American Universities (AAU), which represents most of the major research schools. The AAU's fear is that Congress will change the rules on indirect cost every year, which would cause financial chaos in higher education. A better approach, if reforms are indeed needed, says Scheman, would be for the White House Office of Management and Budget (OMB) to draft a new set of regulations so that institutions will know where they stand financially.

OMB is reportedly planning revisions in Circular A-21, the document that sets out indirect cost recovery rules. Those could be out within a month, and that could put OMB back in the lead in the scramble to "fix" the system. ■ JOSEPH PALCA