

British particle physicists reject proposed cuts for CERN

For the past two months, particle physicists in the United Kingdom, Europe and the United States have been poring over the Kendrew group's report on high-energy particle physics in the UK, a dense 93-page document with another 20 pages of appendices, which was released on 18 June. A rather strong consensus has emerged about the report, and leaders of important institutions already are digging in for what could be a long political struggle. At the same time, it is generally recognized that the report is not without its blessings.

Everybody is relieved that the report recommends, without qualification, that the UK stick by its commitment to stay in CERN and make its agreed-upon contributions until LEP is completed in 1989.

There also is general relief that the

Kendrew report describes particle physics as an extremely important, exciting and basic field (though the report specifically declines to designate it "the most fundamental field imaginable"). Three-quarters of the report are devoted to a detailed account of how particle physics has evolved, Britain's extensive contributions to the field and the special achievements of CERN (see box, page 69).

Particle physicists reject with virtual unanimity, however, the Kendrew group's claim that the UK could cut funding on both CERN and the domestic program in particle physics by 25% between 1989 and 1991 without doing fundamental damage to the field, and that it should do so. There is not much sympathy, either, for John Kendrew's opinion that the energy upgrade of LEP—sometimes called Phase II—

should be delayed into the mid 1990s, until the results of Phase I are in.

Leaders in the field—from Burton Richter at SLAC to Ian Butterworth, science director at CERN—feel that the report's recommendation to cut funding for particle physics by 25%, coming after 74 pages of glowing statements about particle physics and CERN, is a "non sequitur," "out of the blue" or "off the ceiling." Even more grating to them all is the statement in the report that it would be in the interest of particle physics itself, regardless of general conditions, to slow down a bit.

The proposal to cut funding for particle physics by 25% is based on a long list of other science fields that appear to be badly underfunded. At a time when so much of science is suffering, the report reasons, it is hard to justify spending 10% of the total

Kendrew and Llewellyn Smith face off on report

Christopher H. Llewellyn Smith, an Oxford particle physicist who served as consultant for particle physics to the Kendrew committee, took the unusual step of issuing a formal "riposte" to the report the day it was released. Llewellyn Smith said, among other things, that the recommendation to cut Britain's CERN contribution by 25% amounted to a recommendation that CERN's total budget be cut 25% because "there is no prospect of substantial new contributions by 1991 either from new members or from intermediate members..."

Llewellyn Smith said the claim that CERN could absorb a 25% cut by 1991 and still maintain a world-class standard was "false." He characterized as "ludicrous" the report's suggestion that the domestic budget for particle physics also could be cut by 25% in an orderly way.

"The recommendations in the report would severely damage particle physics," Llewellyn Smith said, "while only making a small contribution to the solution of the crisis in science funding, and would also damage the UK's credibility as an international collaborator in science generally."

Llewellyn Smith told PHYSICS TODAY that he considered it "extremely patroniz-



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ing" for the committee to tell particle physicists that they were going "too fast for their own good." He said a colleague had characterized this particular part of the report as a "knee in the groin."

Responding to Smith's complaints, John Kendrew of Oxford University told PHYSICS

TODAY: "We just noticed that particle physics is becoming more and more expensive. Just look at your proposed SSC. It seemed to us that in the long run particle physics is going to price itself out of the market, not only in the UK but everywhere." In advising particle physicists to slow down, Kendrew said the committee was not making a scientific judgment about the field, it was just commenting on the realities of the world. "If every country in the world were to double its spending on science, the situation might be different, but we don't see that happening," he said.

Kendrew said that 25% represents the best judgment of the committee on the cuts that could be made without doing fundamental damage to CERN. "If there were to be cuts, it would be for the high-energy community to decide how they should be distributed.... But at the end of the day, we're talking about 1992, and things might turn out to be different."

"The real take-home lesson is that the UK science budget is too small," he said twice for emphasis. He takes satisfaction in the fact that the Parliament's science committee has been stimulated by the report to make representations to the Prime Minister on science funding.

science budget on just one subfield. (In Britain, particle physics and the physics of nuclear structure are considered branches of nuclear physics.)

Basically, British particle physicists are puzzled about why the Kendrew group believes that allocating one-quarter of the funds from particle physics to other fields would be enough to make much difference to the general state of English science. A quarter of the funds for particle physics is equivalent to just 2% or 3% of the total science budget.

Machiavellian ploy? One interpretation of the Kendrew report is that it is a stratagem designed, really, to highlight the British science crisis. On this interpretation, British scientists and science administrators want to scare the government into increasing the science budget, and they are threatening particle physics precisely because it is the most prestigious science field and is most able to defend itself.

John Kingman, the outgoing chairman of SERC, and David Phillips, the head of the Advisory Board for the Research Councils, have been pressing the government to boost funding for basic scientific research for some time. When they established the Kendrew committee last year, they departed from the normal procedure in such situations and appointed a group that included no particle physicists. Kendrew himself is a Nobel laureate in chemistry, a former director of the European Molecular Biology Laboratory in Heidelberg and the current president of St. John's College, University of Oxford. Kendrew was unhappy about having no particle physicists on the committee and agreed to serve as chairman only on condition that the committee be given a particle physicist as consultant, which led to the appointment of C. H. Llewellyn Smith.

Asked whether it was their real intention to bring pressure on the government to increase science funding, Kendrew said, "Maybe you could say that of the people who commissioned the report. But we didn't choose the topic. We were commissioned to report on particle physics."

If the Kendrew report is indeed to an extent a Machiavellian ploy, there is a general consensus among British particle physicists that it is an extremely dangerous one. When asked last May how the Thatcher government and its science officials might react to a call for sharp cuts in the British contribution to CERN, Derek Colley said, "They're a pretty hard-nosed bunch. They just might do it."

Colley, a particle physicist at the University of Birmingham, resigned as the chairman of SERC's Nuclear Physics Board at the beginning of this year because of frustration at his inability to

get what he regarded as a fair hearing for his constituents. The Nuclear Physics Board, with counsel from subcommittees on nuclear structure and particle physics, advises SERC on the allocation of funds.

SERC and the Advisory Board on Research Councils have endorsed the Kendrew group's conclusions. The task of the particle-physics community, under the circumstances, is to get the government's ear as fast as possible.

CERN's position. The situation at CERN seems to be clear. Because CERN stands to lose less money if the UK were to withdraw than if all member states agreed to a 25% cut, CERN as an institution obviously would prefer British withdrawal of the two alternatives. In an interview conducted at CERN on 26 April, Director General Herwig Schopper did not see any possibility of making major concessions to mollify the British.

CERN came under fire in the UK, Schopper pointed out, largely for two reasons: When the allocations were last readjusted, based on UN estimates of each member's GNP during the years 1979-82, the British contribution went up about 15%; then, on top of that, because of the pound's depreciation against the Swiss franc, Britain's contribution went up another 15%. Because the UK contribution comes out of SERC's general budget, an unexpected increase in the contribution requires SERC to take funds out of other subbudgets.

The obvious solution, as Schopper sees it, is for Britain to put the CERN contribution into a special budget category, which is the practice many other member countries have adopted.

As for the member countries themselves, there is in fact some sentiment in favor of keeping CERN's budget as tight as possible. The German Minister of Science and Technology, for example, recently said that CERN should do everything possible to streamline its operations (see *PHYSICS TODAY*, July, page 69). British particle physicists are convinced, however, that few member countries would support cuts on the scale favored by Kendrew.

J. D. Dowell of the University of Birmingham attended as second UK delegate a meeting of the CERN Council at the end of June and found no support for drastic cuts. He said he planned to write to Keith Joseph, England's Secretary of State for Education and Science, to tell him that insistence by the UK on a cut of 25% would be "tantamount to announcing its withdrawal from CERN."

A united front. Anticipating problems, a large number of English particle physicists held a meeting at Imperial College the morning of 3 May to discuss what they might do to strengthen their

position. Chatting afterwards during lunch at the College, Roger Cashmore (Oxford), David Miller (University College, London), Frank Close (Rutherford-Appleton Laboratory) and Peter Smith (RAL), reviewed the situation.

From meetings with the Kendrew group, they were impressed with Kendrew's grasp on what is going on in particle physics. They noted his direct experience with the use of synchrotron radiation in biology. Still, they seemed to consider it a given that the report's conclusions would be unwelcome. They were thinking about what they could do to make their case to the public more frequently and more effectively, and they were musing about which Members of Parliament might be most susceptible to direct lobbying. There was some feeling that British particle physicists had been spending most of their time dealing with their international collaborators and that they needed to spend more time with each other. Clearly, what the particle physicists wanted to avoid most of all was sniping at each other's budgets.

The discussion was continued at a second meeting at Rutherford-Appleton on 11 July. D. M. Binnie of Imperial College reports. Apparently they held firm in their determination to continue lobbying and to avoid sniping.

According to Dowell, outgoing chairman of the Particle Physics Committee of SERC's Nuclear Physics Board, it is already quite clear what the committee will do if the British government were indeed to insist on drastic cuts. The committee would not accept Kendrew's suggestion that the number of university groups doing particle physics be reduced.

Instead, as the panel that represents the interests of the university groups in SERC deliberations, the Particle Physics Committee would recommend drastic cuts at Rutherford-Appleton, which SERC administers. About 20% of RAL's staff supports work in particle physics, Dowell says, and the committee would recommend that this support staff be cut by 35% or 40%.

In other words, were SERC to tell the Particle Physics Committee to allocate spending cuts of 25%, the committee would tell SERC that the entire cut has to come out of SERC's own budget for RAL.

British public reaction. The reaction to Kendrew in press and Parliament has been surprisingly gratifying for particle physicists in the UK. Both *The Economist* and *The Times* ran pieces strongly critical of the report and critical of the state into which British science funding has fallen. "It has long been a complaint elsewhere in Britain's scientific research community that 'big science,' notably particle physics and astronomy, hogs too much of the bud-

Report praises field but suggests slow-down

The mandate of the committee on high-energy particle physics in the United Kingdom, established on 22 March 1984 under the chairmanship of John Kendrew of Oxford University, was to report to the Advisory Board for the Research Councils (ABRC) and the Science and Engineering Research Council (SERC) on British participation in high-energy physics. It was to concern itself especially with research carried out under international auspices and to consider possible reallocation of the resources, in whole or in part, to other areas of science. Excerpts follow:

"... [M]embers of the public, and even scientists outside the field, are not well informed about the aims of particle physics. ... [T]here is also a widely held view that the cost of [particle physics] has been continually increasing. ... [I]n fact, the proportion of the SERC budget devoted to particle physics has fallen over the past decade from 33% in 1975-76 to the present figure of 20%."

"The importance that we attach to international collaboration ... led us to take it as a boundary condition that ... the UK could not reasonably withdraw from CERN membership before the end of the construction of the new machine (LEP) at CERN, i.e., before December 1989. ..."

"Most particle physicists accept that it is unrealistic to expect that similar large machines will ever again be constructed simultaneously in different geographical regions, and that all future plans should therefore be considered in a global context."

"No one who has any acquaintance with this field of science can see it as other than enormously exciting, exhilarating and intellectually rewarding. ... [B]ut we would not support the contention of some witnesses that particle physics should be regarded [as] the most fundamental study imaginable."

"UK physicists have been involved in many of the major advances in experimental particle physics of the past two decades, including for example: 1) neutrino physics, using the Gargamelle and Big European Bubble Chambers, which measured the electric charges of quarks and proved that the net number of quarks in a nucleon is three ...; 2) ... the work of the European Muon Collaboration on the EMC effect; 3) the discovery of the gluon in the experiments on PETRA at DESY; 4) the discovery of the W and Z and of the top quark on the SPS proton-antiproton collider."

"The interest shown in particle physics by students is a strong argument for research in this field continuing in the UK. ..."

"... [Theorists] would be severely handicapped by a UK withdrawal from experimental particle physics. ..."

"Member states have recently shown their confidence in the administrative abilities of the present Director General [of CERN] by extending his normal five years appointment for a further period to cover the LEP construction. ... However, CERN has evolved rapidly ... [and] we think the time is ripe for a review of its administrative structure."

"[I]n discussions with heads of Research Councils and in testimony from the CVCP [Committee of Vice-Chancellors and Principals] and the Royal Society, we have found evidence of considerable under-funding of important areas of scientific and engineering research. ... We were particularly impressed by the evidence from the CVCP that long-term damage is being done to university research by the high rejection rate of top quality research proposals, and also by the critical state of laboratory instrumentation. ... The damage extends to areas covered by all the Research Councils and is having an effect not only on university research, but also on teaching."

"... [W]ith the present resources available for science in the UK, and taking into account other areas of research that are under-funded or even having to be forgone, the current level of expenditure by the UK on particle physics cannot be justified and should be reduced as rapidly as possible. Indeed, at any realistic level of the SERC budget the proportion now taken up by particle physics is too high. ... [W]e recommend a progressive reduction in the UK total expenditure on particle physics that would be modest up to 1988-89, but would then increase to at least 25% by 1991."

"We ... believe that irrespective of the present acute financial situation the overall level of expenditure on [particle physics] is too high, and therefore that the pace of major capital expenditure at CERN should be reduced by extending the periods between upgrades or between new machines. Indeed, we believe that in view of the high cost of the research, and the possibility of new techniques being developed for accelerating particles, it would not be counter to the long-term interests of the field if the pace could be reduced worldwide and not merely at CERN."

development than to civilian research. "A 2% transfer from defense research and development to civil basic research in the next five years would ... completely transform the position and prospects of the Research Councils and of basic research in the universities," she claimed. "I believe that we must be blunt," she said. "A crisis is facing science."

From meetings with members of Parliament's science committee, Kendrew himself is optimistic that strong representations will be made to the Prime Minister about science. Kendrew considers a re-evaluation of the defense research budget a real possibility, as does Butterworth, science director at CERN.

The world context. Interested observers in the United States remain worried about the British situation. SLAC's Richter feels that the British have "an opportunity in particle physics," but he fears that they will "fritter it away. ... I see British science policy do this again and again. They can surmount any opportunity," Richter said.

An important underlying consideration in Kendrew's thinking and in his committee's report is the conviction that it will no longer be possible in the 1990s for different countries or groups of countries to build similar large machines concurrently. Behind the recommendation for a 25% cut is a calculation that either the Superconducting Super Collider will be funded, in which case the Europeans will want to cut CERN contributions anyway to have funds to participate in the SSC project, or CERN will build something like the proposed Large Hadron Collider in the LEP tunnel, in which case funds will be forthcoming from a larger group of countries.

Richter and Lederman are in agreement that wider participation in CERN is quite within the realm of possibility. But for that to happen, CERN would have to take on non-European members, which would require revision of the CERN convention and would involve the sacrifice of CERN's identity as a uniquely European institution.

In any event, it is not likely that expanded membership or affiliations could make up for reduced European contributions within the time frame envisaged by Kendrew. Butterworth points out that there would be little incentive or opportunity for teams from additional countries to get involved in CERN between 1989 and 1991 because the experiments that are to take place at the initial energy are already well organized. In Schopper's estimation, there would be room for extended membership in the event of a LEP upgrade or a new, large project. —ws

get. In fact," *The Times* noted, "domestic expenditure on particle physics has been cut in half in real terms over the past ten years, and our subscription to CERN has been cut by a third."

In a Parliamentary discussion of science policy on 14 June, the science spokesman for the Labor Party, Jeremy Bray, took note of the fact that the United States, West Germany and France all make substantially greater commitments to civilian basic research than the UK. The absence of well-coordinated policy-making machinery

in the UK had "left nuclear physics to be reviewed on its own by the Kendrew committee," Bray said.

Trevor Skeet, a Tory who chairs Parliament's science committee, agreed that "the United Kingdom could gain from a simplified structure for funding the science budget." He observed that both Germany and France have special ministries to administer basic science.

Judith Hart, a Laborite, was critical of the fact that more government money goes to defense research and