

The last regional particle accelerator?

Next week's meeting of the CERN Council will not, after all, provide the full-throated endorsement of the Large Hadron Collider for which physicists had been hoping. But cautious governments should restrain misanthropy.

EUROPE'S high-energy physics community will know in the next few weeks whether it will be able to build the Large Hadron Collider (LHC) on which it has set its heart. The meeting of the CERN Council next week will be decisive. But expectations that governments party to the CERN treaty, which have been saying that they are "in principle" in favour of the project, would instruct their delegations to make a polite expression of enthusiasm are likely to be disappointed. Britain and Germany (see page 509), acting in concert, hope also to use the council meeting to change the rules by which the annual budget of CERN is fixed. The fear is that the outcome will be that the annual budget to be fixed for 1995 (roughly SFr970 million) will remain unchanged (in Swiss francs) for the following decade, with no allowance for inflation. That, if seriously intended, will be a bad business.

Nobody suggests, of course, that the world (let alone Europe by itself) owes high-energy physics a living. Or that the cost of installing the LHC (in the tunnel built for the electron-positron collider LEP), at roughly US\$2 billion over ten years, is a trivial sum. (CERN had planned to finance three-quarters of the cost from its regular budget, but had been hoping for an extra SFr500 million in the closing years of this decade.) On the contrary, there is every reason to fear that, whatever governments may say to the contrary, national contributions to CERN will diminish what is otherwise available for less esoteric research projects. But CERN's case for the LHC deserves sympathetic attention, particularly now that the high-energy physics community in the United States has been robbed of the Superconducting Super Collider (SSC).

The case for high-energy physics is what its practitioners say: it is the way to learn how matter is constructed, and from

what. Thirty years of sustained effort have produced what is called the Standard Model, that in which the ingredients of matter are quarks and fermions, in which forces between particles are mediated not just by photons and gluons but by intermediate vector bosons (found at CERN in 1990) and in which the shadowy Higgs boson is, in effect, the yardstick of mass. It is not necessary to share the injudicious view that high-energy physics will be done when the Higgs boson has been demonstrated among the products of a sufficiently energetic collision to regard that demonstration as a fit crown for an international intellectual endeavour that has already changed the way the world seems.

Those who hold the purse-strings could, of course, have decided that \$2 billion is a lot to pay to confirm high-energy physicists in their belief that they have been right about the Standard Model all along. (That sense of contentment will be more persuasive when there is more sense to be made of the quantization of gravity, among other things.) But that appears not to be the case. CERN's members, rather, seem ready to let LHC come into being, but some of them appear to insist that it should be built within a budget that declines in real terms. The danger, of course, is that the result will be a botched job. CERN has an excellent reputation for building accelerators to specification, on time and within budget. Skimped engineering could put an end to that. And the old trick of stretching the construction schedule is a recipe for diluting the enthusiasm of the engineers on whom the performance of the LHC will hang.

But why should not the United States make good any shortfall there may be? That beguiling notion is based on a thorough misunderstanding of last year's cancellation by the US Congress of the SSC project, more than four times as expensive as the LHC. There is nothing to suggest that the Congress had not grasped the arguments about the Standard Model. Instead, it took the view that the proposed test of it was unaffordable. Period. Is it likely that the same Congress, with all the enemies it has made in Texas, will change its mind in favour of a project in Geneva?

That is why the best outcome of next week's meeting will be a fudge. Britain and Germany are within their rights to ask for a budget ceiling, but wrong to insist that it must be settled here and now. Better to wait for a couple of years to tell which way the wind is blowing then. On relations with the United States, CERN as a laboratory should be encouraged to keep alive the transatlantic collaboration that has brought high-energy physics to its present state. Euro-chauvinism is the

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