

HERA magnets may need to be upgraded

■ 'Eddy currents' spoil magnetic field

■ Upgrade to cost \$300 million

Munich & Washington

UNFORESEEN problems with the superconducting magnets in the nearly completed HERA (hadron electron ring *anlage*) electron-proton collider in Hamburg, West Germany, may force a costly eleventh-hour upgrade. The technical difficulties are similar to those encountered on prototype magnets for the US Superconducting Super Collider (SSC), which last month led to a costly redesign. But HERA physicists are still optimistic that they can solve the problems with minor, and relatively inexpensive, modifications.

For both HERA and the SSC, the problem begins with the fact that protons are fed by a lower energy accelerator — the injector — into the main ring at an energy much lower than the final energy at which collisions are to take place. Designers of both machines have found that at the injection energy, when only a small current is passed through the superconducting main ring magnets, unexpectedly large 'eddy currents' spoil the magnetic field quality and send the protons crashing into the beam-pipe walls.

Both HERA and the SSC were initially planned with the final energy a factor of twenty higher than the injection energy.

HERA accelerates protons from 40 GeV up to 820 GeV, and the SSC was to take protons from its injector at 1,000 GeV, or 1 TeV, to a collision energy of 20 TeV.

The eddy current problem was discovered in the SSC magnets in the prototyping phase, and SSC officials have decided to double the injector energy to 2 TeV so that the main ring magnets do not need to be run at such low currents. The upgrade, which will cost nearly \$300 million, has led to concern that the project's cost might pass its 'political threshold' and lose its congressional support (see *Nature* 343, 103; 1990).

Early tests on the superconducting magnets at HERA have revealed the same problem. The difficulty would be avoided if the protons were injected at 80 to 100 GeV, making the injection to final energy ratio about 10, as in the redesigned SSC. But in HERA's current design, the injector is an existing machine known as PETRA, and redesigning it would mean throwing PETRA away and building a wholly new injector. The cost of such an overhaul would be about DM30 million, (\$18 million) according to HERA research director Paul Söding. Nearly DM1,000

million has already been spent on the machine.

Nevertheless, physicists at HERA are still optimistic that they will be able to avoid the SSC's problems and are now trying to build additional magnets that will counteract the eddies.

Unfortunately, the task is not simple. The eddies vary irregularly with time, making it difficult to build compensating magnets.

The problem is made worse because HERA includes ostensibly identical magnets made by separate teams in Italy and West Germany. The magnitude and behaviour of the eddies depends strongly on the internal structure of the superconducting cable, and it turns out that magnets made in Italy behave differently from those made in West Germany. Two different strategies for compensation have had to be developed, and Italian magnets and West German magnets will be bunched in alternating octants around the ring. HERA officials will make no decision on an injector upgrade until the main ring is finished, later this year, and are hoping that some combination of these small alterations will dispose of the eddy problem.

US researchers familiar with the project are sceptical that the West German scientists will solve a problem that stumped teams of SSC planners. "It's clear that they'll get some particles to go around, but the question is how many", says SSC physicist Roger Koons. One of the key factors in a collider is the rate at which collisions occur, which depends on the beam luminosity. An accelerator that directs particles onto a fixed target can overcome a low luminosity by running for longer times, but for colliders such as HERA and the SSC, a certain minimum luminosity is essential if any collisions at all are to be produced.

SSC researchers say they are watching the developments at HERA closely. One lesson the US researchers have already learned is not to mix superconducting cable from different sources. Because of HERA's difficulties, the SSC will only use cable either manufactured or supervised by a single vendor.

"If you don't understand the physics of superconducting cable, the next best thing is to make it all exactly the same", says Paul Mantsch, a physicist at the Fermi National Laboratory where the SSC magnets are being designed.

Steven Dickman & G. Christopher Anderson

INTERNATIONAL BIOTECHNOLOGY —

Swiss company takes a 60 per cent stake in Genentech

Washington

LAST Friday's announcement that the Swiss-based multinational health-care conglomerate, Roche Holdings Ltd, is to spend \$2,100 million for a 60 per cent stake in Genentech, Inc., the largest US biotechnology company, took Wall Street and the biotechnology world by surprise. The proposed 'merger' was generally well received and sent Genentech stock soaring by almost \$8 a share by the end of Friday. The deal is expected to give Genentech the financial depth to take new products from development through the drug approval process to commercial fruition. But coming at a time of increasing concern over foreign investment in US industry, the agreement raises the question of whether smaller biotechnology companies can hope to remain independent and still realize their long-term potential.

Under the agreement, which is subject to approval by stockholders in April, Roche will purchase half of Genentech's existing shares at \$36 each — 65 per cent above last Thursday's closing price.

Roche will also spend a further \$492 million in capital to buy new shares, bringing its total ownership to 60 per cent. Despite its majority equity interest, Roche will have only two members on the 13-member Genentech board, allowing Genentech to continue as an independent, publicly traded company with control over its research programme. Genentech has been soliciting such a merger since the summer.

The deal comes at a crucial time for the San-Francisco-based Genentech, whose 1989 revenues were \$400 million. Apart from the approval of additional uses for existing drugs, the company will not have any significant new products on the market for a few years.

Gamma interferon, which initially will be used to treat a rare immune-related disorder, and a CD4-based AIDS drug are in the late stages of clinical trials. Genentech therefore needs to increase sales of the two products currently on the market, the blood clot-dissolving drug Activase (tissue plasminogen activator, TPA) and human growth hormone.

Sales of TPA failed to live up to expectations after its approval in 1987, and stock prices fell to below \$15 a share in 1988 from a peak of more than \$60 in 1987. The high cost of TPA, which at \$2,200 a dose was ten times that of a rival drug Streptokinase, was an obstacle to its widespread use. Recently, TPA has been challenged by SmithKline Beecham's Eminase, which is more easily administered and costs \$1,700 a dose.

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