

Window shopping

'A large window for surprises' was how Gordon Kane of Michigan summarized the potential of the proposed 84-kilometre US Superconducting Supercollider (SSC). With George Trilling of Berkeley unable to attend this year's High Energy Physics Conference at Vanderbilt University, Nashville, Tennessee, from 8-10 October, Kane played a dual role – looking ahead to SSC physics, and summarizing the meeting.

Earlier, Stan Wojcicki of the SSC Central Design Group reported on the status of the proposal for the huge machine. A list of candidate sites has been drawn up (see November issue, page 17), and after site selection (which could be as early as next July), the hope is for 20 TeV (20 000 GeV) per beam in 1996. Meanwhile a Senate committee has recommended \$ 35 million for the SSC in the current financial year while the Administration explores means of funding the project, estimated at \$ 3210 million, including labour costs.

The Senate report also recommends exploring international collaboration. Whatever solution is adopted, said Wojcicki, the machine should be operated under the guidelines laid down by ICFA (International Committee for Future Accelerators), with scientific merit as the major criterion for selecting experiments.

Whatever unexpected physics might come in through the SSC window, physicists are preoccupied with the search for the 'Higgs' mechanism. This provides the otherwise unchallenged electroweak picture with its missing link – the source of mass. (Why, for example, are the W and Z particles carrying the weak nuclear force almost 100 times heavier than the proton, while the proton carrier of

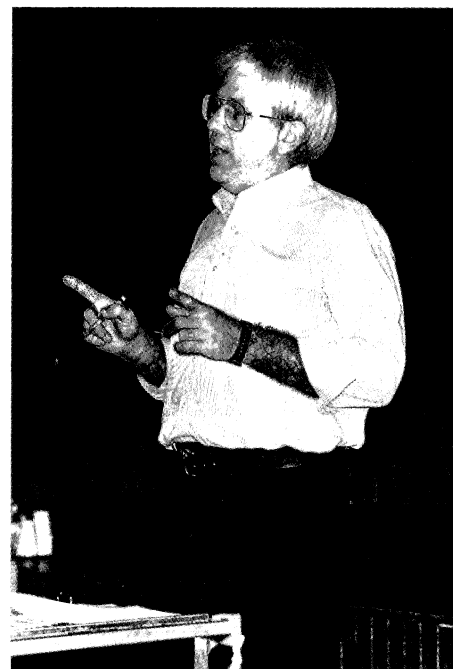
electromagnetism has no mass at all?)

Possible Higgs scenarios and signatures were described by Tom Weiler of Vanderbilt. In the almost complete absence of experimental input, a lot of Higgs candidates jostle for attention. Kane underlined the potential complexity of the problem – 'as well as finding where the Higgs is, we have to find where it isn't'. Higgs dogma comes in three Kane variants – 'fundamentalism, theism and atheism' – which should be experimentally distinguishable.

Kane wrote off Higgs searches at the existing proton-antiproton colliders at CERN and Fermilab, claiming that the collision rates (luminosities) are too low to pick up the rare production processes. At higher hadron collider energies, such as those envisaged for the SSC and for the LHC Large Hadron Collider proposed for the tunnel being built for CERN's LEP electron-positron collider, Kane highlighted the luminosities needed to see candidate Higgs mechanisms, arguing that the higher energies envisaged for the bigger SSC demand less luminosity.

Higgs hunting was also on the agenda of Gary Feldman of SLAC, looking at the physics possible with linear colliders providing 1 TeV electron and positron beams, pointing out the increased difficulty of finding what the Higgs mechanism looks like if it only comes into play at TeV energies.

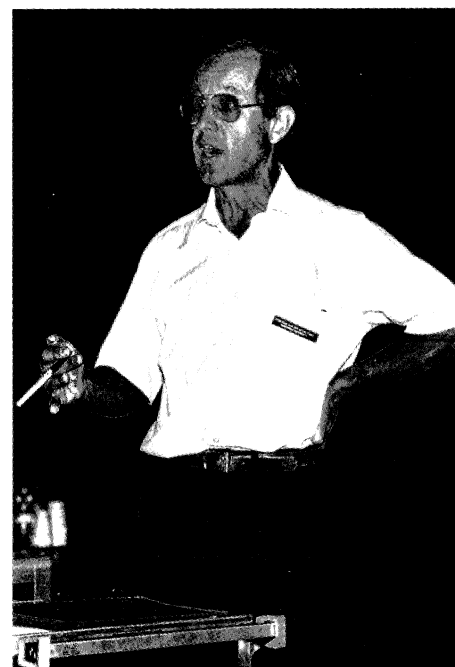
While the detectors for Feldman's machine were 'easy to build', this is not the case for the SSC. M. Gilchriese of the SSC Central Design Group highlighted the challenge of designing and building detectors for the huge machine. He saw calorimetry (measurement of deposited energy) as the highest



▲ Gordon Kane – the proposed US Superconducting Supercollider (SSC) is a large window for surprises.

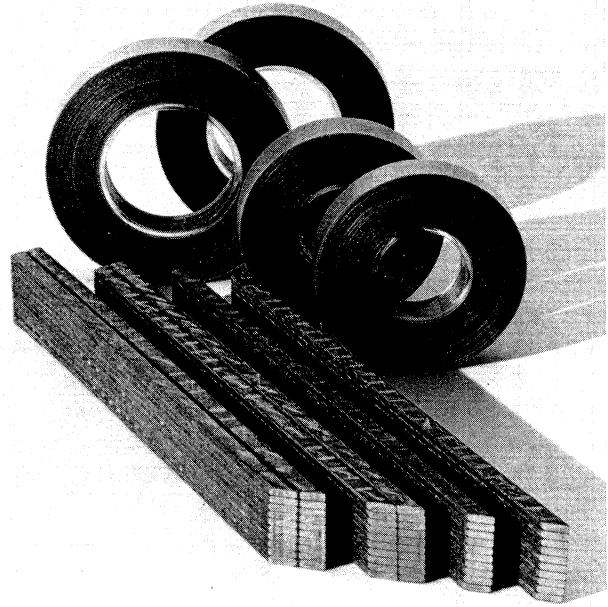
(Photos D. Hildebrand)

▼ Stan Wojcicki of the SSC Central Design Group – looking for money as well as love from the US administration.

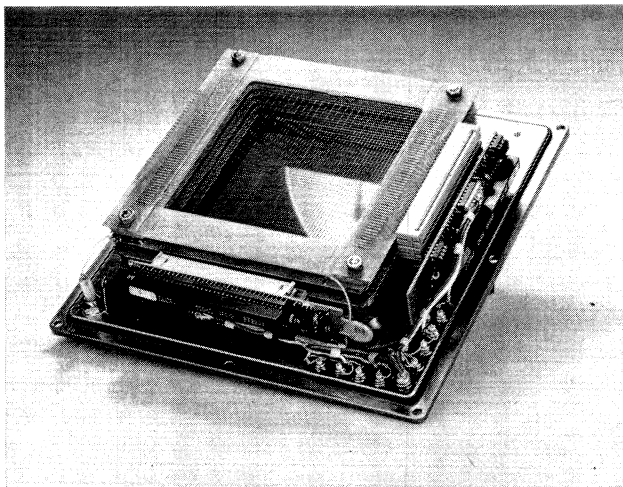


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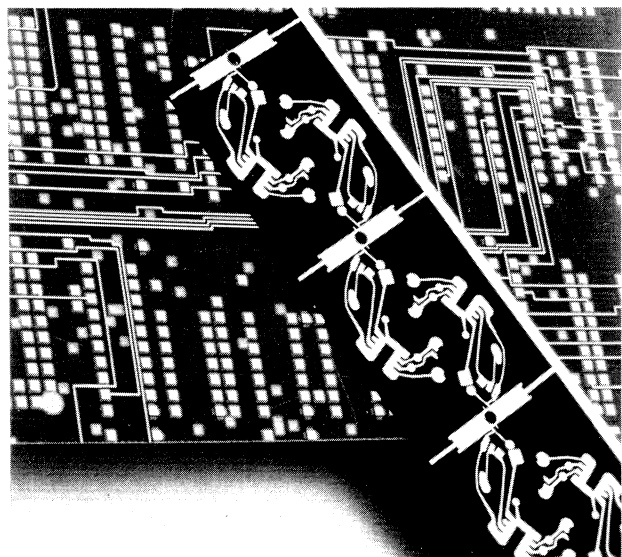
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priority, where a whole list of sampler/absorber combinations are possible. Jim Rohlf of Harvard described the work going on at the UA1 detector at CERN's proton-antiproton collider to reequip with room temperature liquid (TMP – tetramethyl pentane, boiling at 122°) as the sampling medium. However Rohlf advocated the more volatile (26.5° b. p.) TMS – tetramethyl silane – for use at the SSC.

Still important but of lesser priority, according to Gilchriese, are electronics, radiation resistance, tracking and simulation. Whatever the SSC detectors would turn out to look like, Gilchriese saw them as involving highly international

teams. Paul Kunz of SLAC, speaking on computing ('today's software is a mess') did not foresee any greatly increased mess for the SSC.

The Vanderbilt meeting also heard from Steve Schnetzer of Rutgers on the new results from the TRISTAN electron-positron collider at the Japanese KEK Laboratory (see page 18), while Virgil Barnes of Purdue covered the outcome of the Tevatron proton-antiproton collider run earlier this year (see page 14).

Fred Gilman of SLAC looked at the decays of heavy particles, hinting that in recent months the inconsistencies in the decay data of tau

leptons, far from clearing up, were getting worse. Elsewhere on the heavy particle front, the pattern of CP symmetry (switching left and right and particles and antiparticles) violation expected with B mesons could be 'much richer' than with neutral kaons, the only known CP violation example so far explored.

'The question 'Where to B?' was taken up by Elliott Bloom of SLAC, looking at proposals for B particle factories.

In his conclusion, Kane was sceptical about recent limits on the long-awaited sixth ('top') quark, pointing out the assumptions built into these estimations.

Brookhaven at 40 – looking forward as well as back

Irene Haworth and Brookhaven Director Nick Samios at the Dedication of Brookhaven's accelerators as the Leland J. Haworth Complex in memory of the Laboratory's Director from 1948-61.

In 1947, the famous Camp Upton Army Base on New York's Long Island switched to a new career as Brookhaven National Laboratory. The reputation the Laboratory has established as a world-class research centre and its continued attraction for scientists looking for exciting possibilities were highlighted on 9-11 September at a symposium and celebration marking forty years of Brookhaven and its parent organization, AUI (Associated Universities Inc).

For many of the visitors, Brookhaven has been a focus of their scientific careers, sometimes resulting in great discoveries. They were joined by many present and former employees, by state and

