

ICFA on international collaboration

At the recent ICFA 'Future perspectives' workshop at DESY, Hamburg, international collaboration was highlighted in a memorable panel discussion. Participating were, left to right, ECFA Chairman Gunter Flügge (Aachen), B. Richter (SLAC), V. Soergel (ex-DESY, Chairman), A. Skrinsky (Novosibirsk), HEPAP chairman Stan Wojcicki (Stanford), and S. Yamada (Tokyo).

International collaboration in high energy physics is what ICFA - the International Committee for Future Accelerators - is all about. Progress is highlighted every three years when ICFA convenes its 'Future Perspectives in High Energy Physics' seminar to focus attention on major issues and to identify evolving trends.

The latest such seminar, held at the DESY Laboratory in Hamburg from 3-7 May, looked at international cooperation in the construction of major facilities. Status reports across the whole range of existing experimental programmes and ongoing plans gave valuable pointers to future needs. For electron-positron linear colliders (EPLC), research and development work towards the next generation of machines is underway in Laboratories throughout the world.

At previous such seminars, at Tsukuba, Japan (1984), Brookhaven, USA (1987) and Protvino (1990), ICFA, which has no direct power, could sometimes only stand on the sidelines and comment on the emergence of major new national plans. The lessons learnt, ICFA is keen to make sure that the EPLC debut on the world stage will be better choreographed.

In addition to plans for new major experimental facilities, the Hamburg seminar also provided a valuable snapshot of the current scene and the directions in which ongoing research is poised to take. This covered existing facilities and projects, 'factories' to mass-produce specific particles, fixed target studies and non-accelerator experiments as well as the key EPLC development theme. B-physics, the study of particles containing the fifth, or 'beauty' (b) quark, emerged as an important thread running across several machine scenarios.



Culmination of the Hamburg meeting was the endorsement by ICFA of a tripartite memorandum of understanding between DESY in Germany, KEK in Japan, and Stanford (SLAC) in the US, on the research and development work for an EPLC to attain collision energies in the 300-400 GeV range, and a luminosity of 10^{33} per sq cm per s. The consensus view is that 'at most one' such machine should be built. Although the explicit agreement examined by ICFA initially includes only three Laboratories, progress towards these colliders is pushing ahead on a much wider front, and other signatories are welcome.

Elsewhere, ICFA has set up a new group under Hans Hoffmann of CERN to examine the practical applications and spinoff of high energy physics. This group complements the existing list of special ICFA panels covering instrumentation, superconductivity and cryogenics, beam dynamics and accelerator technology.

International collaboration was highlighted in a memorable panel discussion. Participating were the members of a special ICFA subgroup - B. Richter from SLAC, A. Skrinsky from Novosibirsk, S. Yamada from Tokyo, and V. Soergel (ex-DESY, Chairman), - complemented for the occasion by HEPAP chairman Stan Wojcicki (Stanford) and ECFA Chairman Gunter Flügge (Aachen).

Soergel set out ICFA's 'league table' of project access - a first stage of national or regional facilities operated by a single host nation; a second stage with major international involvement, as exemplified by the HERA electron-proton collider at DESY; a third stage with several nations sharing the outlay, such as the JET fusion project in Europe, but with no explicit high energy accelerator example so far (although this is the attack used for major collider detectors); and the fourth stage of facilities managed by an international organization like CERN. An immediate aim, said Soergel, is to decide at

which of these levels to pitch the ongoing EPLC effort.

Burt Richter surveyed ICFA's dismal track record so far of international collaboration for new machines and looked forward to this collaboration really getting off the ground for EPLC.

Gunther Flügge of ECFA (European Committee for Future Accelerators) pointed to ECFA's successful role in coordinating and furthering major new projects in Europe, where both LEP at CERN and HERA at DESY benefited. For Europe, ECFA's current preoccupation is the LHC collider for CERN's LEP tunnel.

Stan Wojcicki thought the world community to be 'overextended' and recommended involving existing laboratories rather than building new ones. Skrinky stressed the plight of Russia and other ex-USSR countries, while Yamada thought it too early to 'fix' things with too many avenues still to be explored.

A lofty tone for the workshop came from Lev Okun's introductory 'perspectives' talk. The prime problem is the higgs sector, Okun declared. (He thought it was also time to drop the capital 'H'.) Without the higgs, many fundamental problems of current theory remain a mystery. 'Discovery of the higgs will give insight into one of the most simple yet most complex objects - the vacuum,' he continued.

In the days of the cold war, high energy physics was often a spearhead for new collaboration across political boundaries. 'Now, with the cold war over, more governments ... reverse the nuclear arms race. It would be tragic if high energy physics progress would be sacrificed under the pretext of more urgent needs,' Okun proclaimed.

Leading up to these conclusions, Okun emphasized that the precision

electroweak numbers from LEP are still almost devoid of radiative corrections. 'How can it be,' he asked rhetorically, 'that unobserved radiative corrections nevertheless give strong limits on the mass of the (unseen) top quark?' Contributions from top and other virtual particles tend to cancel, he explained.

The workshop then came down to earth for a series of status reports on all major ongoing facilities and projects, including a whole day devoted to EPLC, with contributions from SLAC, CERN, Protvino/Novosibirsk, KEK, DESY and the widely-supported superconducting TESLA collaboration. A matrix of major collaborations spans several different approaches, including TESLA.

(Interesting and profitable as these status reports were, this ground was retrodden at the May Washington Particle Accelerator Conference. A full report will feature in our next issue.)

Emerging at the Hamburg workshop as a common theme across several experimental routes is B physics (June, page 16). After the door to this research was opened at Fermilab in 1977, a trail was blazed by a range of experiments in the 1980s, with the arrival on the scene of LEP in 1989 providing a valuable boost. The CESR ring at Cornell is making progress (June, page 1) and will continue, but to write a new chapter of B physics needs a lot more particles.

Plans for purpose-built B factories have been tabled by SLAC, Cornell, Novosibirsk and KEK, using existing infrastructure from the PEP, CESR, VEPP and TRISTAN electron-positron rings respectively.

But B particles will also be manufactured in large numbers at existing

proton machines as the performance of Fermilab's Tevatron and DESY's HERA proton ring is cranked higher. With many B achievements to their credit, the Argus collaboration at DESY's small DORIS electron-positron ring has stopped data-taking, and members are looking at the possibility of new studies at HERA.

LHC at CERN and the SSC in the US will open additional hadronic doors to B production, and the LHC Experiments Committee at CERN is currently looking at initial ideas for experiments. In the US, a special Fermilab-SSC Snowmass summer workshop is looking at B physics possibilities.

Concluding the Hamburg meeting, ICFA Chairman and Fermilab Director John Peoples underlined the value of addressing scientifically and politically controversial issues. Describing ICFA as a 'facilitator' towards world research, he maintained that ICFA is indeed facilitating.