About 30 Canadian physicists had been involved in the SDC detector collaboration for the ill-fated US Superconducting Supercollider (SSC) project. Some 25 Canadians were on the SSC foreign visitor roll when the project was cancelled last October.

WORKSHOP
Beam cooling

Cooling - the control of unruly particles to provide well-behaved beams - has become a major new tool in accelerator physics. The main approaches of electron cooling pioneered by Gersh Budker at Novosibirsk and stochastic cooling by Simon van der Meer at CERN, are now complemented by additional ideas, such as laser cooling of ions and ionization cooling of muons.

In these techniques, the idea is to expose the disordered beams to a controlling influence which absorbs (in the case of electron cooling) the disorder, or applies suitable corrections (in the case of stochastic cooling).

Organized by CERN's Antiproton Rings Group, a workshop on beam cooling and related techniques held late last year in Montreux, Switzerland, attracted a useful audience.

It was the continuation of a series of earlier meetings - Karlsruhe 1984, Wertheim 1988, Legnaro and Tokyo 1990 - mostly given over to electron cooling.

To begin the meeting, the principles of the various techniques, their achieved performances and prospects were the subjects of a relatively formal series of presentations.

This was followed by a presentation on a proposal for Maser Cyclotron (CMC) cooling. In the ensuing discussion it emerged that the scheme required further work and analysis since the results achieved to date do not provide conclusive evidence for its feasibility.

Attention in the stochastic cooling presentations focused on beams, bunches and on the usefulness of devices with bandwiths covering much higher frequencies.

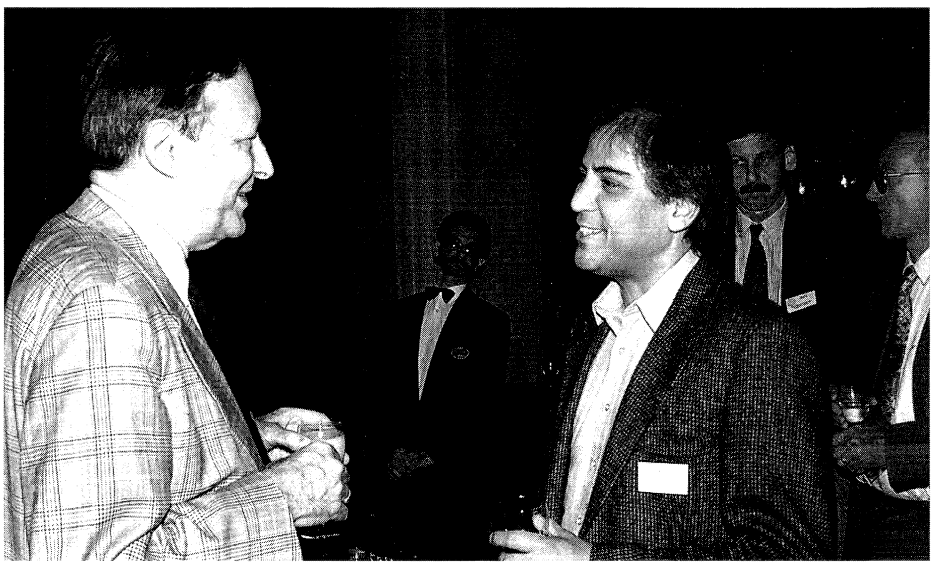
A device for the electron cooling of ions aroused considerable interest since all were agreed that the density limit had been reached and that a wide-band damper (100 to 500 MHz) was needed. Another very interesting conclusion was that the cooling speed of heavy ions by electrons depends on whether the beam is cold or diffused.

Several ideas were aired on the cooling of muons to increase density. These proposals are still being examined but given the limited lifetime of muons and the associated technical difficulties, they seem, for the time being, difficult to realise.

Some laboratories use laser cooling but, despite their many advantages, such devices have two important drawbacks: cooling only certain types of ion, depending on the characteristics of the laser used; and cooling only in the longitudinal plane.

To offset these shortcomings, a complementary transverse cooling system can be added (e.g. an electron cooling system) to improve performance.

Considerable interest was shown in prospects for applying cooling techniques for 'crystallizing' very cold beams. A prototype strong-focusing machine and a mathematical model was presented. The beam crystals are not always aligned but sometimes arranged in zig-zags. Applications of these devices for heavy ion accelerators and for crystallization were also examined.



At the ICFA meeting at the TRIUMF Laboratory, Vancouver, on 16 January - ICFA Chairman John Peoples (right) with Secretary Roy Rubinstein
(Photo M. Pavan, TRIUMF)