SCOPE OF THE WORKSHOP

D. Cline
Fermi National Accelerator Laboratory
and
University of Wisconsin at Madison

A Workshop was held during the week of March 27-31 at the Lawrence Berkeley Laboratory in Berkeley, California. The purpose of the Workshop was to discuss various beam-cooling techniques and to investigate the possibility of constructing high luminosity proton-antiproton storage rings. Herman Grunder and other members of the LBL staff were largely responsible for the efficient operation of the Workshop and the success. The Workshop was jointly sponsored by Fermilab and LBL.

That this was the first workshop totally devoted to beam cooling and to high luminosity $\bar{p}p$ storage rings indicates the close coupling between the two subjects. The construction of $\bar{p}p$ storage rings is an old dream of accelerator physicists, the practical realization of these machines certainly relies on beam-cooling techniques. The late G. Budker often discussed the possibility of $\bar{p}p$ storage rings and realized that beam cooling would be crucial to such schemes. The first realistic schemes for such machines using existing accelerators were outlined in 1976 (Appendix VIIa). Subsequently, both CERN and Fermilab have made detailed plans for such machines (IIIc,d). There are also discussions of a $\bar{p}p$ option at ISABELLE (IIIe). The reports in which the CERN and Fermilab machines are described in some detail are reproduced in Appendices VII b and c of these proceedings for completeness.

The first day of the Workshop was devoted to the physics motivation for high luminosity $\bar{p}p$ machines (Section II) and the general concepts of beam-cooling techniques as well as the most up-to-date plans for $\bar{p}p$ machines at CERN, Fermilab, and BNL (Section III).

The reports of the working groups are given in Section IV. It is with deep regret that we note that Frank Sacherer was killed in Switzerland after the Workshop was finished. He made a brilliant contribution to the theoretical understanding of stochastic cooling (IVa).

The highlights of the Workshop in my biased opinion were:

1. The very interesting talk of R. Feynman on ultra high energy interactions (IIa) and the historical surveys of beam cooling by A. Sessler and R. R. Wilson.

2. The general conviction that $\bar{p}p$ machines proposed in the present CERN and Fermilab schemes are sound (IIIc, d; IVc; Vb).

3. The discussion of the cooling of high energy proton-antiproton beams by electrons (Rubbia, Month, Ruggiero) or by synchrotron radiation (Wilson). The report of Ruggiero, Vh, was completed after the Workshop and is reproduced here for completeness.

4. The understanding of improvements in target efficiency that can raise the $\bar{p}$ yield by a considerable factor (IVd).

5. The possibility of high luminosity $\bar{p}p$ machines with $\mathcal{L} \geq 10^{31} cm^{-2} sec^{-1}$ either at CERN, Fermilab, or BNL now seems very likely. There are no fundamental obstacles to such machines (IVc).

6. Looking to the future there was a lively debate about the relative merits of high energy - high luminosity $\bar{p}p$ machines and e^+e^- machines. The maximum useful luminosity to these machines given present detector capabilities was also debated (IVe).

All in all, the Workshop was a good start towards the future of $\bar{p}p$ storage rings and refined beam-cooling techniques. We can now probably look forward to the day when a multi-TeV $\bar{p}p$ storage ring with $\mathcal{L} > 10^{31}$ $cm^{-2} sec^{-1}$ will exist somewhere in the world soon after the machines at CERN and Fermilab are operational.

I would like to thank our hosts and the participants for a very interesting Workshop.