



BNL-105820-2014-TECH

EP&S No. 105;BNL-105820-2014-IR

## Accumulator/Booster alternative

R. Thern

September 1983

Collider Accelerator Department  
**Brookhaven National Laboratory**

**U.S. Department of Energy**

USDOE Office of Science (SC)

Notice: This technical note has been authored by employees of Brookhaven Science Associates, LLC under Contract No. DE-AC02-76CH00016 with the U.S. Department of Energy. The publisher by accepting the technical note for publication acknowledges that the United States Government retains a non-exclusive, paid-up, irrevocable, world-wide license to publish or reproduce the published form of this technical note, or allow others to do so, for United States Government purposes.

## **DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Accelerator Department  
BROOKHAVEN NATIONAL LABORATORY  
Associated Universities, Inc.  
Upton, New York 11973

EP&S Division Technical Note No. 105

R. Thern and S.P. Yamin

September 27, 1983

**ACCUMULATOR/BOOSTER ALTERNATIVE**

We suggest a possible alternative to the Accumulator/Booster. The large (rf: \$8M; ring magnet power supply: \$5M) preliminary cost estimates for A/B components prompted this type of radical speculation.

We suggest that a 4 GeV accumulator ring be built alongside the AGS in the present tunnel. The AGS would accelerate protons or  $H^-$  to 4 GeV and then inject them into the accumulator ring (stripping the  $H^-$ ). This process would be repeated several times until the ring was filled. At this point, the protons in the accumulator ring would be synchronously transferred back to the AGS, where they would be accelerated to full energy.

The proposed scheme may achieve the goals of the A/B project at considerably reduced cost. For example, the accumulator ring will consist of unpulsed low-field magnets, which should make it simple and cheap. It can also be powered with an inexpensive DC supply. While some rf will be required for maintaining bunching in the accumulator ring, it need only be narrow band and probably not costly. Among the remaining uncertainties are whether the AGS vacuum is good enough to enable  $H^-$  to be accelerated to 4 GeV, and whether the acceleration from 200 MeV to 4 GeV can be performed quickly enough to make the time economics reasonable.

Since this idea was conceived, the authors have learned that Gordon Danby proposed a similar scheme many years ago. He suggested that the accumulator operate at  $E \gtrsim 8$  GeV, with  $v > 8$ . By appropriately transferring the beam between the AGS and the booster, transition could be avoided. While Gordon cannot be held responsible for our mistakes, any merit to our suggestions derives in part from the fallout of his beneficial presence.