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MEETING OF THE INTERNATIONAL COOPERATION ON  
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June 22-26, 1981

Status of the Los Alamos Proton Storage Ring\*

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Abstract

The Proton Storage Ring for the Weapons Neutron Research Facility of the Los Alamos National Laboratory is reviewed as a construction project. The current status of construction and design is outlined.

Introduction

The purpose of this paper is not to describe the design features of the Los Alamos Proton Storage Ring (Ref. 1), but to describe the present status of the Ring as a construction project. To that end we will start by describing the status of the design and construction of the buildings, followed by the status of procurement actions, and finally we will indicate the design status of various components of the Ring.

Building Construction

A 12,500 square foot (1160 square metre) staging building is presently under construction and is scheduled for completion by July 15, 1981. This building will provide room for component fabrication and testing, as well as magnet assembly and mapping. Areas have been allocated for such activities as vacuum, low-level electronics, fast-kicker development, and 600 MHz and 3 MHz rf research and development. There will also be a machine shop in the building.

The Architect-Engineer for the project, Randy Holt and Associates of Albuquerque, New Mexico, is currently making detailed construction drawings of the Ring tunnel and the equipment building. These drawings should be complete by October 1, so that construction bids will be requested about October 15. The bids should be received by December 1 and opened December 15, so that construction of the Ring tunnel should begin in early 1982.

The Ring tunnel will be 18.5 feet (5.6 metres) wide and 12 feet (3.7 metres) high. The equipment building, which will house the power

\*Work performed under the auspices of US Department of Energy.

supplies, rf sources, and general electronics, will be 90 feet square (27 metres square) and will be located above the Ring tunnel. The vertical separation from the roof of the tunnel to the floor of the equipment building will be 23.5 feet (7.2 metres) of earth and steel shielding.

#### Equipment Procurements

In this section we will indicate what major items have been purchased or have been put out for bids. In general those items which have been completely specified and for which complete design drawings are in hand have either been purchased or bids requested; we are not holding back any orders.

A Digital Equipment Company VAX 11/750 has been purchased as the control computer; it should arrive by July 1, 1981. Approximately 60% of all the vacuum equipment has been purchased. This percentage includes all the vacuum pumps and their controllers, valves, ion gauges, and pumping tees. The five injection line quadrupole magnets have been purchased; the power supplies for these magnets are out for bid. The bids for the Ring dipole magnets are due to be received June 15; the copper conductor for the prototype magnet coil has been purchased. The power supply specifications for the Ring dipoles are being written at this time and shortly will go out for bid. The power triodes for the transverse damper distributed amplifiers are on order. Finally, the 603.75 MHz transmitter is out for bids.

#### Design Status

The injection and extraction line optics, to be reported on at this conference by A. Jason, have been developed to the point where the location and size of the skew dipole magnets and the quadrupole magnets can be specified. As a result, these magnets are now in the process of being designed. The Ring focusing quadrupoles are also being designed, as are the septum magnets. The beam dump for the unstripped neutral injected beam is being designed.

#### Research and Development

Areas of significant research and development effort in the PSR project tend to be centered about those items which are expected to have a long lead time. Principal among these items is the fast extraction kicker, the power supply (ferrite-isolated Blumlein line) for which has recently achieved its rated voltage and repetition rate ( $\pm 50$  kV, 1 kA, 720 Hz). The active damper high-power electronics have been under development for several years (Ref. 2). A prototype beam position monitor (stripline electrodes) has been developed and installed in Line D for testing purposes. With an eye toward solving or alleviating the beam loading problem in the 603.75 MHz rf system some effort has been spent in developing rapid cavity detuning techniques.

Areas which have received little research effort to the present time include principally the rf bunching systems (an area of considerable concern), the beam scraper system, and the multipole magnet system. These areas are now starting to be addressed in a significant way, although our efforts could benefit greatly by the addition of experienced personnel.

References 3 through 6 are papers on PSR research and development published in the proceedings of the March 1981 National Accelerator Conference in Washington, DC.

Schedule

Presented here in tabular form is the projected schedule for the PSR:

3/83	Beneficial occupancy of Ring tunnel
6/83	Beneficial occupancy of equipment building
3/84	Line D modifications complete
6/84	PSR equipment installation complete
10/84 thru	
3/85	LAMPF/Line D/WNR shutdown
3/85	PSR ready to accept beam

References

1. George P. Lawrence *et al.*, "LASL High-Current Proton Storage Ring," Proc. of the XI Int. Conf. on High Energy Accelerators, p. 103, Geneva, Switzerland, July 1980.
2. James S. Lunsford, "Design of a Power Amplifier for the LAMPF Proton Storage Ring Transverse Damper System," IEEE Trans. on Nucl. Sci., NS-28, p. 2952, 1981.
3. E. Higgins and F. Wells, "A Beam Position Monitor System for the Proton Storage Ring at LAMPF," IEEE Trans. on Nucl. Sci., NS-28, p. 2308, 1981.
4. B. Sandberg, "A Novel Current Monitor for DC and Modulated Magnets in the Proton Storage Ring," IEEE Trans. on Nucl. Sci., NS-28, p. 2314, 1981.
5. Andrew J. Jason *et al.*, "Neutralization of H<sup>-</sup> Beams by Magnetic Stripping," IEEE Trans. on Nucl. Sci., NS-28, p. 2704, 1981.
6. Daniel W. Hudgings and Andrew J. Jason, "Los Alamos Proton Storage Ring Extraction System," IEEE Trans. on Nucl. Sci., NS-28, p. 2791, 1981.