

1 TeV ON 1 TeV pp/pp DEDICATED COLLIDER AT FERMILAB USING ENERGY SAVER COMPONENTS

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Some possible machine options for the near term (before 1990) exploit Saver technology and existing production capability. (Leon Lederman's talk at this Summer Study.) Using Saver components in a new tunnel dedicated pp or pp storage rings could be constructed relatively quickly and at modest cost. Production of magnets for a 1 km ring (774 dipoles and 200 quadrupoles) would require two years using the existing magnet factory. During the magnet production, tunnel and experimental facility construction could proceed. Installation and commissioning of the ring and the installation of experiments would require another year. If magnet production were to proceed for two more years and a year allowed for installation of the second ring, a pp facility could be realized.

The accompanying table shows cost estimates for a collider based on our experience with the Energy Saver. R & D and EDIA are not included in the cost estimates. Some of these costs, however, have already been absorbed in the Saver project. The Saver magnet costs used are averages over the production period. The magnet costs for an extended production run would probably be lower and would certainly cover any contingency. No spares are included.

Magnet costs are based on the Saver lattice including dipoles, quadrupoles and spools. Although minor improvements in the basic magnet design and fabrication procedures would be made to reduce costs, fundamental changes would be avoided. Refrigeration costs are set at two-thirds of the Saver since ramping will occur rarely and then slowly. Tunnel costs include utilities and are based on recent experience. Six 100-meter straight sections are assumed. Mechanical costs include vacuum system, magnet mounts, etc. Electrical costs include power supplies, cabling, etc. The control system is estimated to be twice that of the Saver since the Saver has many controls in common with the main ring. Installation and testing costs are assumed to be the same as those for the Saver. Injection includes extraction from the main ring, transport lines, and injection into the collider.

The availability of the Saver magnet factory with trained personnel would be a tremendous advantage in time and cost in building machines that would extend our physics capability substantially over the next several years.

* Operated by Universities Research Inc., under contract with the U.S. Department of Energy.

Cost Table for Storage Rings at Fermilab

	<u>pp(1 ring)</u> <u>(\$1,000)</u>	<u>pp (2 ring)</u> <u>(\$1,000)</u>
Magnets	\$ 52,500	\$105,000
Refrigeration	\$ 16,000	\$ 28,000
Tunnel	\$ 40,000	\$ 40,000
Mechanical	\$ 5,500	\$ 10,000
Electrical	\$ 5,000	\$ 10,000
Controls	\$ 2,000	\$ 3,000
Testing & Installation	\$ 8,000	\$ 16,000
Injection	\$ 15,000	\$ 15,000
Experimental Areas	\$ 25,000	\$ 25,000
R.F.	\$ 4,000	\$ 4,000
Civil	\$ 4,000	\$ 4,000
TOTAL	\$177,000	\$260,000