
Register of the Caltech Synchrotron Laboratory papers, 1949-1970

Processed by Charlotte E. Erwin; machine-readable finding aid created by Michael C. Conkin; updated by Kevin C. Knox.

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Descriptive Summary

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Abstract: These papers document Caltech's building of a one-billion volt (1 BeV) electron accelerator, the synchrotron. Funded by the U.S. Atomic Energy Commission, the project marked the beginning of high energy physics at Caltech. The records consist of photos, technical notes, reports, conference proceedings, and proposals to the Atomic Energy Commission.

Language: English.

Access

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Acquisition Information

The synchrotron papers were donated to the Caltech Archives by Professor Robert L. Walker.

Preferred Citation

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Introduction

In the Spring of 1949, the Institute announced plans to build a one-billion volt ("1 BeV") electron accelerator. Robert Bacher, chairman of Caltech's Physics Division, stated: "The purpose of the new accelerator will be to seek additional knowledge about the nature of the forces

that hold atomic nuclei together." The new accelerator, the synchrotron, would be the most powerful machine of its type ever built. The funding of the project by the U.S. Atomic Energy Commission marked the beginning of high energy physics at Caltech.

The synchrotron was the successor to the cyclotron--developed in 1932 by E.O. Lawrence--in that it extended the voltage range of high energy accelerators by the application of new physical principles. These were developed independently in 1945 by Edwin M. McMillan at Berkeley (Caltech B.A. 1928, M.S. 1929, Ph.D. 1932) and V. Veksler in Russia. McMillan later won the Nobel Prize in Chemistry in 1951 and the Atoms for Peace Prize jointly with Veksler in 1963.

The Caltech machine went into preliminary use in the summer of 1950. By 1956 it had been modified to increase its energy level to above 1 BeV. In 1961, it reached 1.5 BeV, accelerating electrons to within a few feet per second of the speed of light. Important early experiments were conducted on K-meson photoproduction, and investigations of the electromagnetic couplings of a growing number of pion-nucleon resonances were carried out. Over the years, the program concentrated largely on studies of photoproduction processes in the available energy region.

Operation of the synchrotron ended in February, 1970. Well before this time, it had become evident that collaborative efforts in experimental work were more efficient because of the complexity of the work involved and the cost of the equipment. A user program, initiated in 1962, linked Caltech with Berkeley's Lawrence Radiation Laboratory, Brookhaven National Laboratory, the Stanford Linear Accelerator, and other universities. The user program continued to expand, as accelerators entered a "super" category in both size and cost.

Charlotte Erwin

Assistant Archivist

November 1989

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Scope and Content of Collection

Proposals, technical notes, reports, correspondence, specifications, reprints and photos; materials relating to the Atomic Energy Commission; materials on the Rochester Conferences on Ultrahigh Energy Accelerators (1952, 1955, 1956, 1960); plus other conferences and organizations.

Indexing Terms

The following terms have been used to index the description of this collection.

California Institute of Technology

U.S. Atomic Energy Commission

Rochester Conference on Ultrahigh Energy Accelerators, 1952

Rochester Conference on Ultrahigh Energy Accelerators, 1955

Rochester Conference on Ultrahigh Energy Accelerators, 1956

Rochester Conference on Ultrahigh Energy Accelerators, 1960

Particle accelerators--United States--California

Proton accelerators--Research

Synchrotrons--United States--California

Laboratory notebooks

Photographs

Reports

Related Collections

Users of the synchrotron collection should also see:

Papers of Robert F. Bacher

Robert F. Bacher Oral History (1981)

Papers of Lee A. DuBridge

Papers of Bruce H. Rule, Supplement 1984

Papers of Robert L. Walker

Robert L. Walker Oral History (1997-1998)

Photo Archives, Synchrotron photos

SECTION I: ATOMIC ENERGY COMMISSION: PROPOSALS, BUDGET REPORTS, CORRESPONDENCE 1949-1962

Box 1, Folder 1.1	Proposal for a 1 BeV Electron Synchrotron, November 15, 1949
Folder 1.2	Contract for 1 BeV Electron Synchrotron, February, 1950
Folder 1.3	Progress Report and Proposal for Contract Supplement, August 22, 1951
Folder 1.4	Progress Reports, January 1, 1953 to November 30, 1962
Folder 1.5	Budget Proposals, 1953 to September 30, 1963
Folder 1.6	"Proposals to the Atomic Energy Commission for the support of the Accelerator Design- Study Program of the Western Accelerator Group," April 1961. With excerpts of reviewers' comments, June 1961.
Box 2, Folder 2.1	Lawrence Radiation Laboratory, "Proposal to the AEC for a National Design Study of an Ultra-High Energy Accelerator." With memo from Lee DuBridge to Robert Bacher, March 1, 1962; also miscellaneous
Folder 2.2	Brookhaven National Laboratory, "Proposal to the Atomic Energy Commission for the Establishment of a 300-1000 BeV National Accelerator Design Study," February 1962. With letter to Robert Bacher from Paul W. McDaniel, AEC, April 19, 1962
Folder 2.3	Correspondence, Robert Bacher and Paul McDaniel, 1951
Folder 2.4	Correspondence, Robert Bacher and George Kolstad, 1960

SECTION II: ORGANIZATIONS AND CONFERENCES

Box 2	Rochester Conferences on Ultrahigh Energy Accelerators
Folder 2.5	1952
Folder 2.6	1955
Folder 2.7	1956
Folder 2.8	1960
Folder 2.9	Western Accelerator Group (WAG), correspondence and documents, September 1960 to January 1963
Box 3, Folder 3.1	Summer Study Group on High Energy Accelerators, Lawrence Radiation Laboratory, Berkeley, 1961
Folder 3.2	International Accelerator Project, 1961
Folder 3.3	Formation of a High Energy Physics Association (HEPA), correspondence and documents, September 1964 to 1965

SECTION III: TECHNICAL NOTES, REPORTS, AND REPRINTS

Box 3, Folder 3.4	Technical Specifications, 1950, 1953
Folder 3.5	Carbon 14 work, 1950
Folder 3.6	Caltech Synchrotron Laboratory (CTSL) Reports, 1960-1961
Box 4, Folder 4.1	Caltech Synchrotron Laboratory (CTSL) reports, 1961
Folder 4.2	Caltech Synchrotron Laboratory (CTSL) reports, 1962-1966
Folder 4.3	Reports to Office of Naval Research, 1968, 1970
Box 5	Reports and abstracts, 1964-1970; reprints, unbound
Box 6	Reprints, 3 volumes, bound

SECTION IV: PHOTOS

Box 6, Folder 6.1	Photos
Box 7A & 7B [index boxes]	Photos