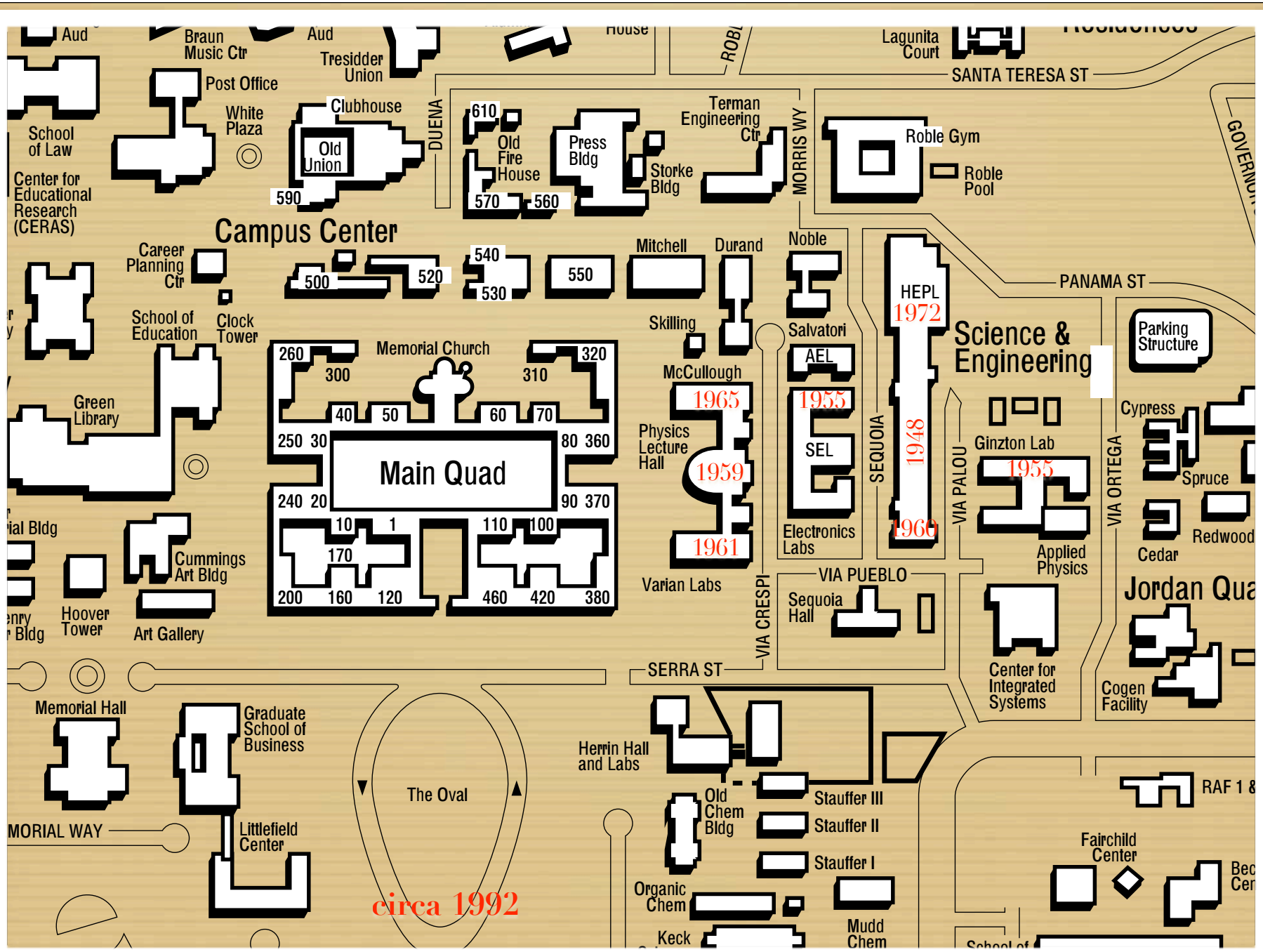
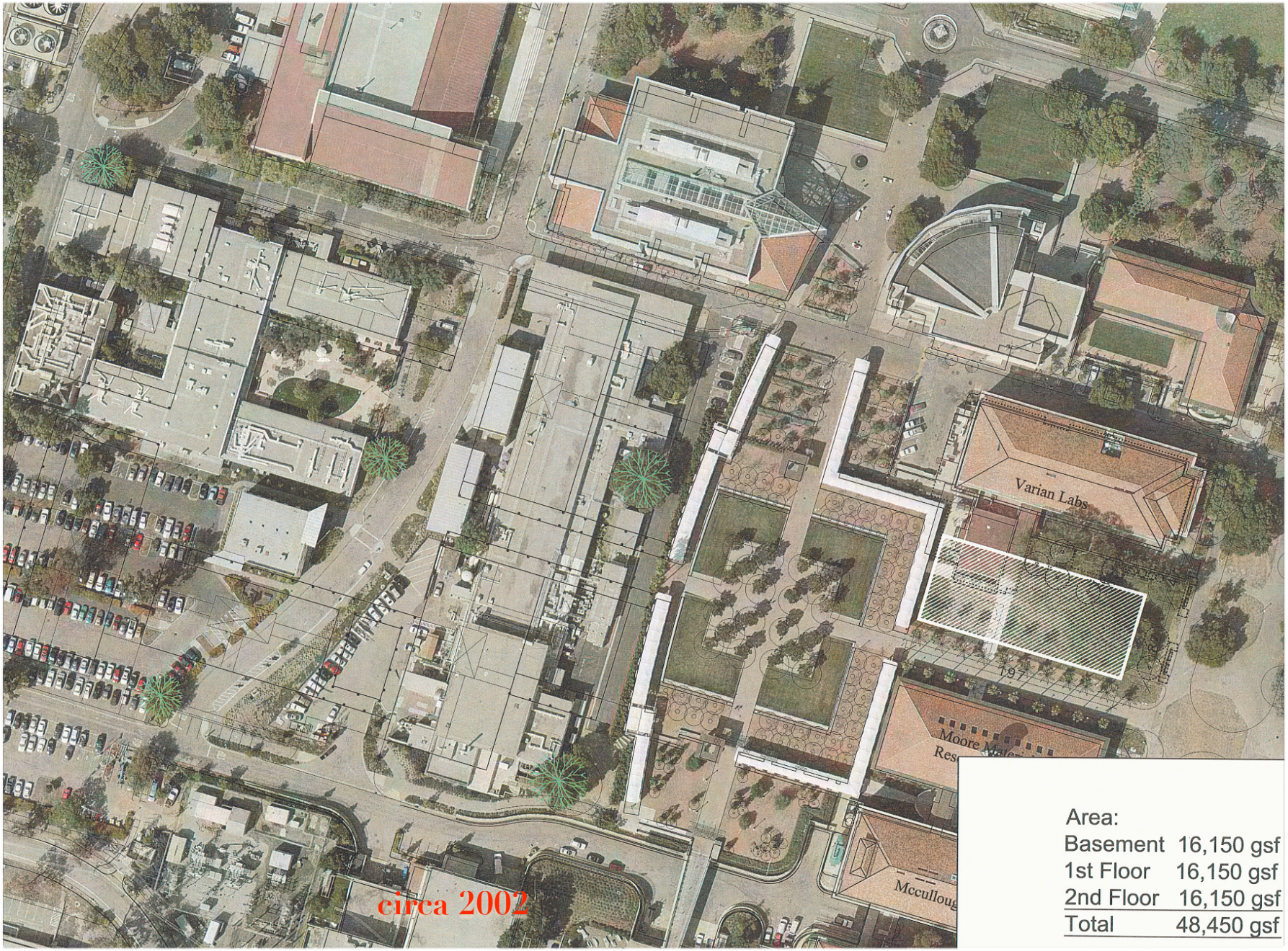
History of HEPL
Hansen Experimental Physics Laboratory

going away party before demolition
November 5, 2007

(prepared by Blas Cabrera with information from Stanford News archives and web)


Aud
Braun Music Ctr
Aud
Tresidder Union
House
ROBLE
Lagunita Court
SANTA TERESA ST
School of Law
Post Office
White Plaza
Clubhouse
Old Union
590
DUENA
610
Old Fire House
570
560
Press Bldg
Storke Bldg
Terman Engineering Ctr
MORRIS WY
Roble Gym
Roble Pool
GOVERNOR
Center for Educational Research (CERAS)
Campus Center
Career Planning Ctr
500
520
540
530
550
Mitchell
Durand
Noble
PANAMA ST
HEPL
1972
School of Education
Clock Tower
Skilling
Salvatori
Science & Engineering
Parking Structure
260
300
Memorial Church
320
310
McCullough
1965
AEL
1955
Cypress
Green Library
40
50
60
70
Physics Lecture Hall
1959
SEL
1948
SEQUOIA
Ginzton Lab
1955
VIA PALOU
VIA ORTEGA
250
30
Main Quad
80
360
Spruce
1961
Electronics Labs
1966
Applied Physics
Redwood
Cedar
240
20
90
370
10
1
110
100
170
Cummings Art Bldg
Varian Labs
VIA PUEBLO
Jordan Qua
Hoover Tower
200
160
120
460
420
380
Sequoia Hall
Art Gallery
VIA CRESPI
SERRA ST
Center for Integrated Systems
Cogen Facility
Memorial Hall
Graduate School of Business
The Oval
Herrin Hall and Labs
RAF 1 &
MORIAL WAY
Littlefield Center
Old Chem Bldg
Stauffer III
Stauffer II
Stauffer I
Fairchild Center
Organic Chem
Mudd Chem
Keck
circa 1992

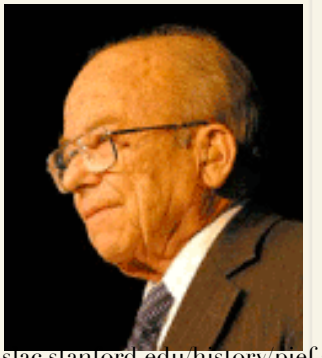


Area:	
Basement	16,150 gsf
1st Floor	16,150 gsf
2nd Floor	16,150 gsf
Total	48,450 gsf

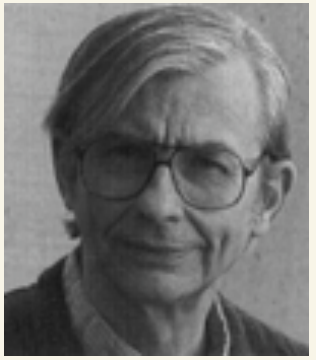
HEPL Directors

- W.W. Hansen (1947 - 1949)
- Edward Ginzton (1949 - 1958)
- Wolfgang Panofsky (1958 - 1961)
- Carl Barber (1961 - 1967)
- Robert Hofstader (1967 -1973)
- Mason Yearian (1973 - 1996)
- Sandy Fetter (1996 - 1997)
- Robert Byer (1997 - 2006)
- Blas Cabrera (2006 - present)

Pief headed Project M which lead to formation of SLAC in 1961



http://www.slac.stanford.edu/history/pief.shtml



http://www.stanford.edu/dept/physics/people/faculty/yearian_mason.html

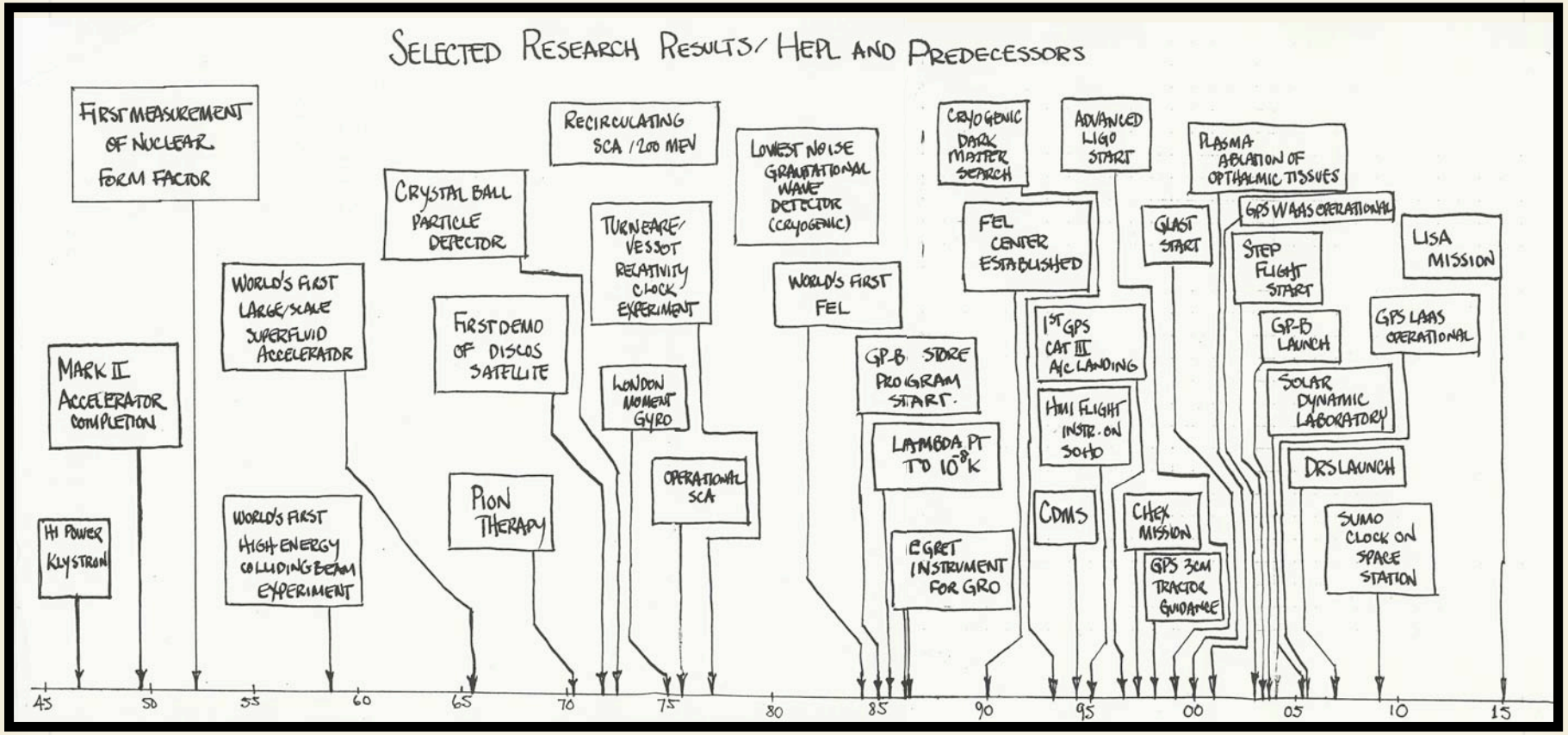
Administrative Directors

- Frederick Pindar (1950 - 1958)
- Marshall O'Neill (1958 - 1990)
- Robert Farnsworth (1990 - 1998)
- Robin Maslin (1998 - 2001)
- Anne Green (2001 - 2004)
- Nancy Christiansen (2004 - present)

http://www.stanford.edu/dept/DoR/Marsh

(Marsh O'Neill was administrative head of both HEPL and Ginzton, then starting in 1990 with Bob Farnsworth the laboratory administrations were separated)

Rich History & Bright Future



by Brad Parkinson

W. W. Hansen
1909 - 1949

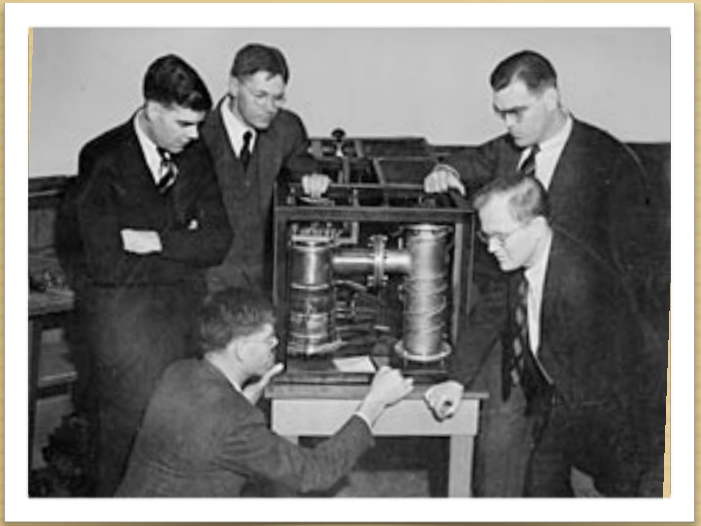
Since the early 1930's, William W. Hansen, had wanted to use high-frequency waves to accelerate particles to high energy. Two brothers, Sigurd and Russell Varian, who were interested in generating the very-high-frequency short wavelength signals needed for radar and direction finding, began working with Hansen in the basement of the old physics building (now Quad Math corner). They demonstrated in 1937 the first very-high-frequency source, which they named the klystron. Hansen pioneered the development of microwave theory and techniques for testing microwave systems and gave courses on microwave theory at Stanford and during World War II to physicists who were being recruited for research on the subject.

After the war, Hansen returned to his original objective of accelerating electrons to high energies. Working with three graduate students, he demonstrated the first 4.5 MeV linear accelerator in 1947. His progress report to his sponsor, the Office of Naval Research, contained only four words, "We have accelerated electrons." To produce higher energies, 30 MW klystrons a thousand times more powerful than had been made before, were developed by his associates Edward Ginzton and Marvin Chodorow, and three years after Hansen's untimely death in 1949, a 1 BeV 220 foot long accelerator was completed. This work eventually led to the two mile long 25 BeV SLAC accelerator and the first use of the electron storage ring for x-ray spectroscopy in the Stanford Synchotron Radiation Laboratory (SSRL).

http://www.stanford.edu/group/ginzton/history.html

Klystron Tube

http://www.stanford.edu/home/welcome/research/klystron.html



Russell Varian (1899-1959), left, and Sigurd Varian (1901-1961) appear in this 1951 photograph with a high-powered klystron. In the palm of his hand, Russell Varian holds a smaller type of klystron used for radar, aircraft instrument landing and microwave communications. (co-founders of Varian Associates in 1948)

Stanford researchers in 1939 examine their invention, a klystron. Standing from left to right are Sigurd Varian, physicists David Webster and William Hansen, and in the front are Russell Varian, left, also a physicist, and John Woodyard, an engineering graduate student.

William Hansen and brothers Russell and Sigurd Varian invented the klystron tube, a high-frequency amplifier for generating microwaves. It revolutionized high-energy physics and microwave research and led to the airborne radar used in aircraft today. The klystron also has been used in satellite communications, airplane and missile guidance systems, and telephone and television transmission.

RUSSELL VARIAN PHYSICS LABORATORY BUILDING PAID FOR FROM KLYSTRON ROYALTIES

The klystron represents one of Stanford's best investments: $100 in seed money and use of a small laboratory room were turned into $2.56 million in licensing fees before the patents expired in the 1970s, three major campus buildings and hundreds of thousands of dollars in research funding.

http://www.geocities.com/neveyaakov/electro_science/varian_russell.html

Mark I accelerator:

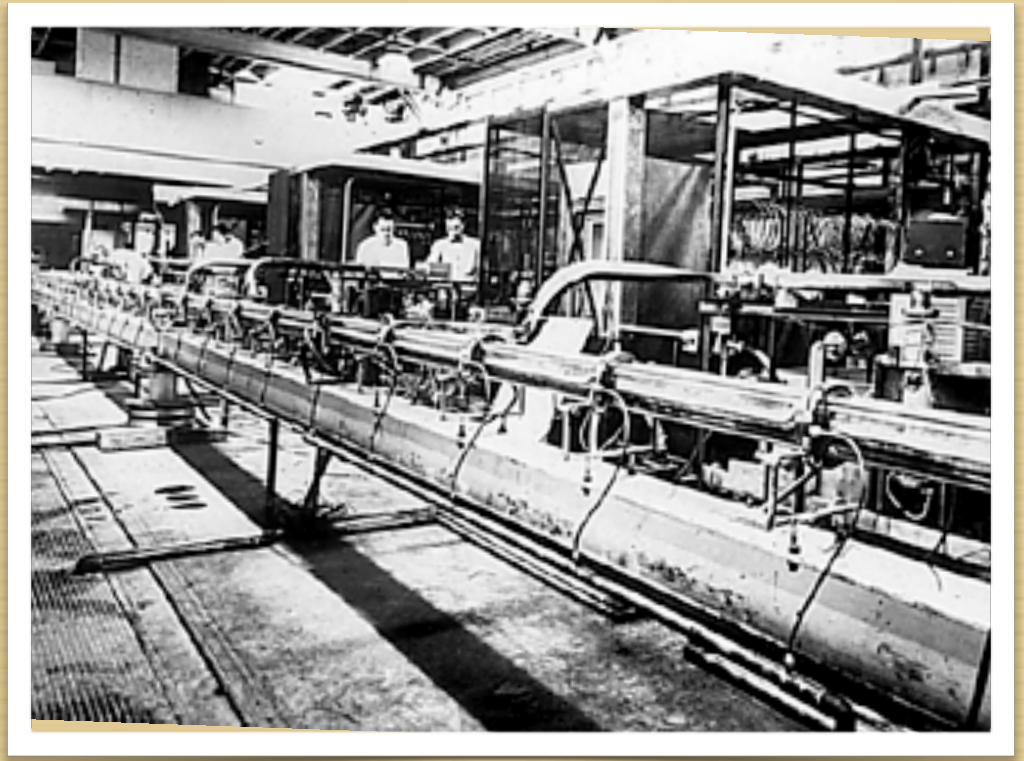
This historic photo, taken in about 1946, shows W.W. Hansen and three students carrying one of the first linear electron accelerator sections ever built at Stanford.

http://www.slac.stanford.edu/history/markphotos.shtml

Mark II accelerator:

Karl Brown at the klystron controls for the Mark II in 1949 or 1950.

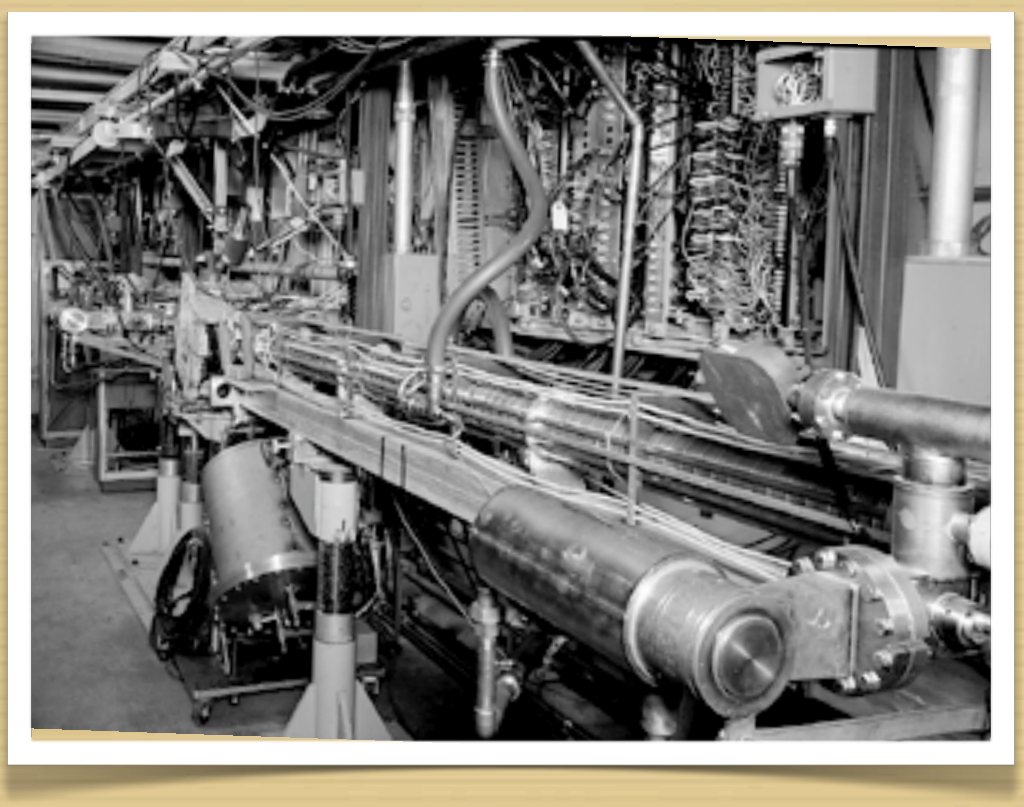
http://www.slac.stanford.edu/history/markphotos.shtml



Mark III accelerator:

An undressed section of the Mark III accelerator at Stanford (shown without its concrete shielding blocks)

http://www.slac.stanford.edu/history/markphotos.shtml

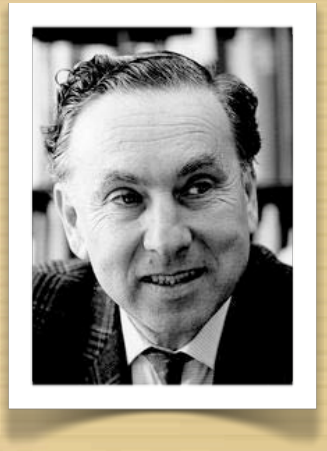


Mark IV accelerator:

The Mark IV was designed as a vehicle for improving accelerator components, but was also used at times for beta-ray cancer therapy.

http://www.slac.stanford.edu/history/markphotos.shtml

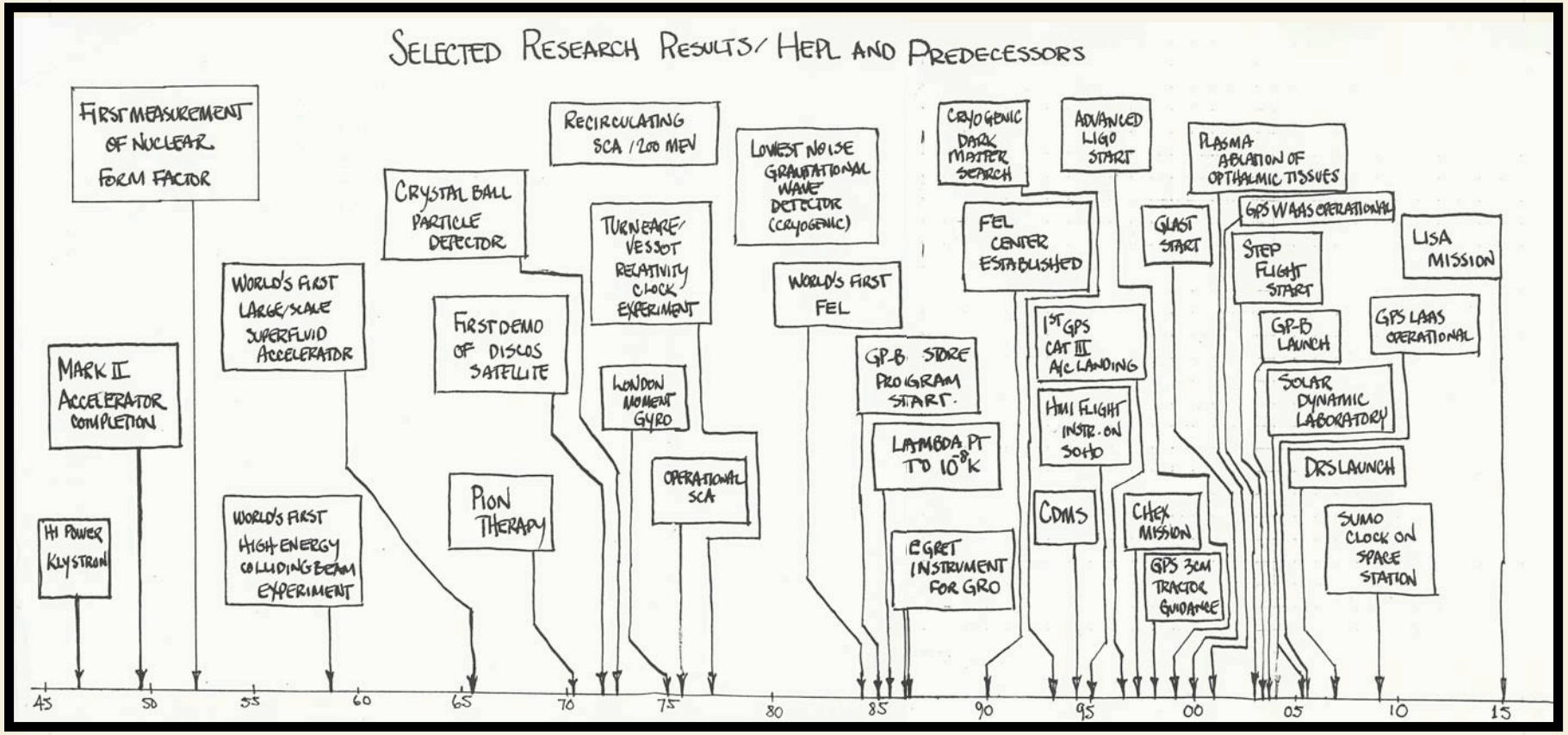
Robert Hofstadter (1915 - 1990)



Awarded the Nobel Prize for Physics in 1961 for his investigations of protons and neutrons, which revealed the hitherto unknown structure of these particles. Hofstadter taught at Stanford University from 1950 to 1985. At Stanford he used a linear electron accelerator to measure and explore the constituents of atomic nuclei. At the time, protons, neutrons, and electrons were all thought to be structureless particles; Hofstadter discovered that protons and neutrons have a definite size and form. He was able to determine the precise size of the proton and neutron and provide the first reasonably consistent picture of the structure of the atomic nucleus. Hofstadter found that both the proton and neutron have a central, positively charged core surrounded by a double cloud of pi-mesons. Both clouds are positively charged in the proton, but in the neutron the inner cloud is negatively charged, thus giving a net zero charge for the entire particle.

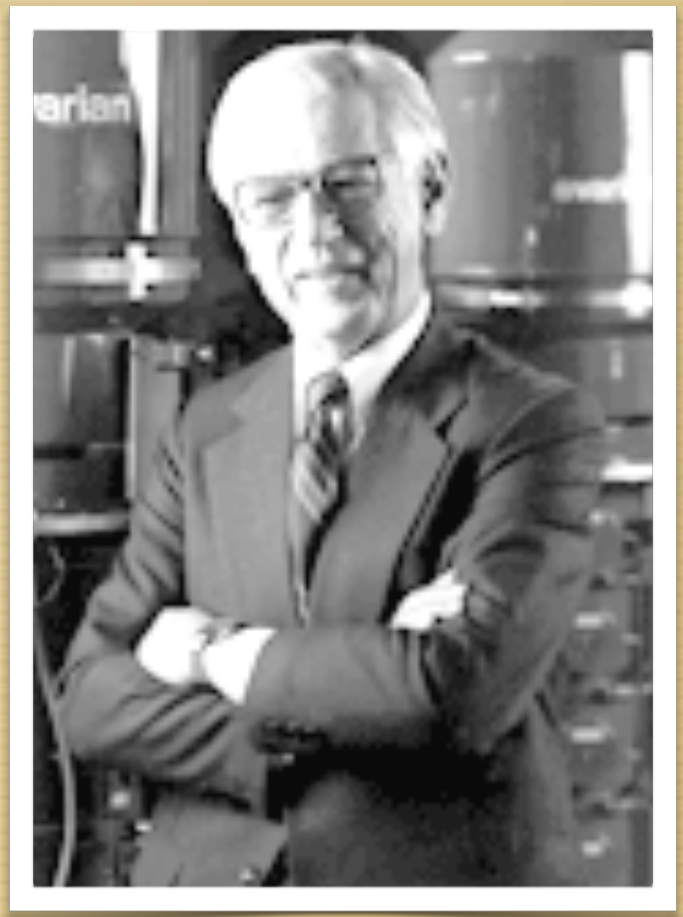
http://books.nap.edu/html/biomems/rhofstadter.html

Rich History & Bright Future



by Brad Parkinson

Edward L. Ginzton 1915 - 1998



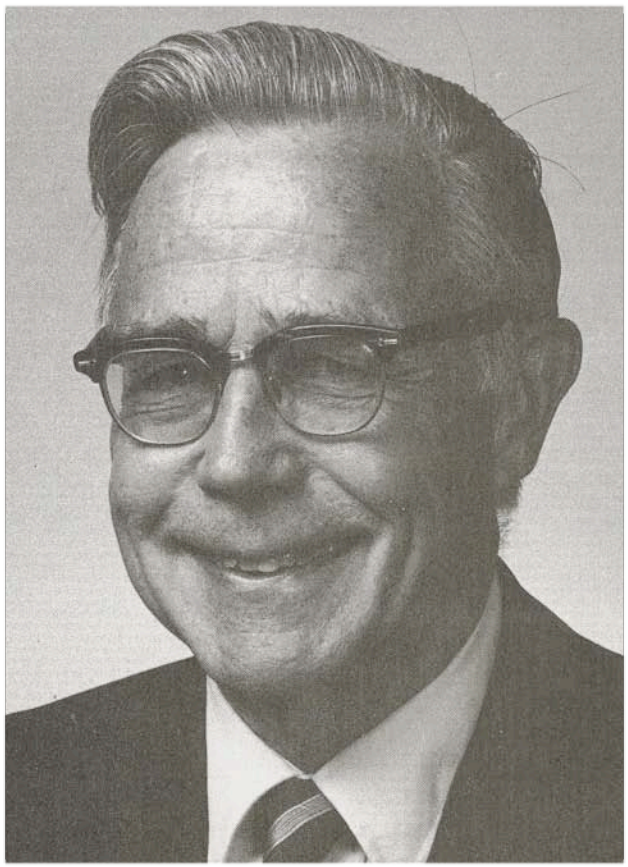
SEPARATE LABORATORIES

Upon completion of the 1 BeV accelerator, the original laboratory split into two parts, the Microwave Laboratory (later renamed the Ginzton Laboratory) and the High Energy Physics Laboratory (HEPL, later renamed the Hansen Experimental Physics Laboratory). The Microwave Laboratory, under its director Edward L. Ginzton, concentrated on microwave research for scientific purposes, while HEPL investigated the application of the new accelerator for basic physics research. The students and faculty of the Microwave Laboratory were drawn mainly from the Physics Department (later from the Applied Physics Department) and the Electrical Engineering Department.

Under Ginzton and Chodorow's leadership, research continued on microwave high-power, traveling-wave amplifiers and klystrons. This basic work on waves was later extended to the investigation of other types of wave phenomena. Examples were waves in plasmas (Gordon Kino, Peter Sturrock, and others); the development of acoustic surface wave devices (John Shaw, Calvin Quate, Gordon Kino, and Bert Auld); waves in ferrites (Bert Auld and John Shaw); the invention of the acoustic microscope by Calvin Quate; and the development of a wide range of basic theory of maser and laser concepts by Tony Siegman and Ed Jaynes. This was followed by the demonstration of optical parametric oscillators and of the acousto-optic filter by Steve Harris, as well as the later development of diode-pumped lasers by Bob Byer. A fiber optics group was established under the leadership of John Shaw, who invented the fiber-optic gyroscope.

http://www.stanford.edu/group/ginzton/history.html

William Fairbank (1917-1989)



Fairbank was professor of physics at Stanford from 1959-89. In 1961 Fairbank with B. S. Deaver discovered of flux quantization in superconductors. Fairbank was also instrumental in the early development of superconducting accelerators laying foundations for later accelerators.

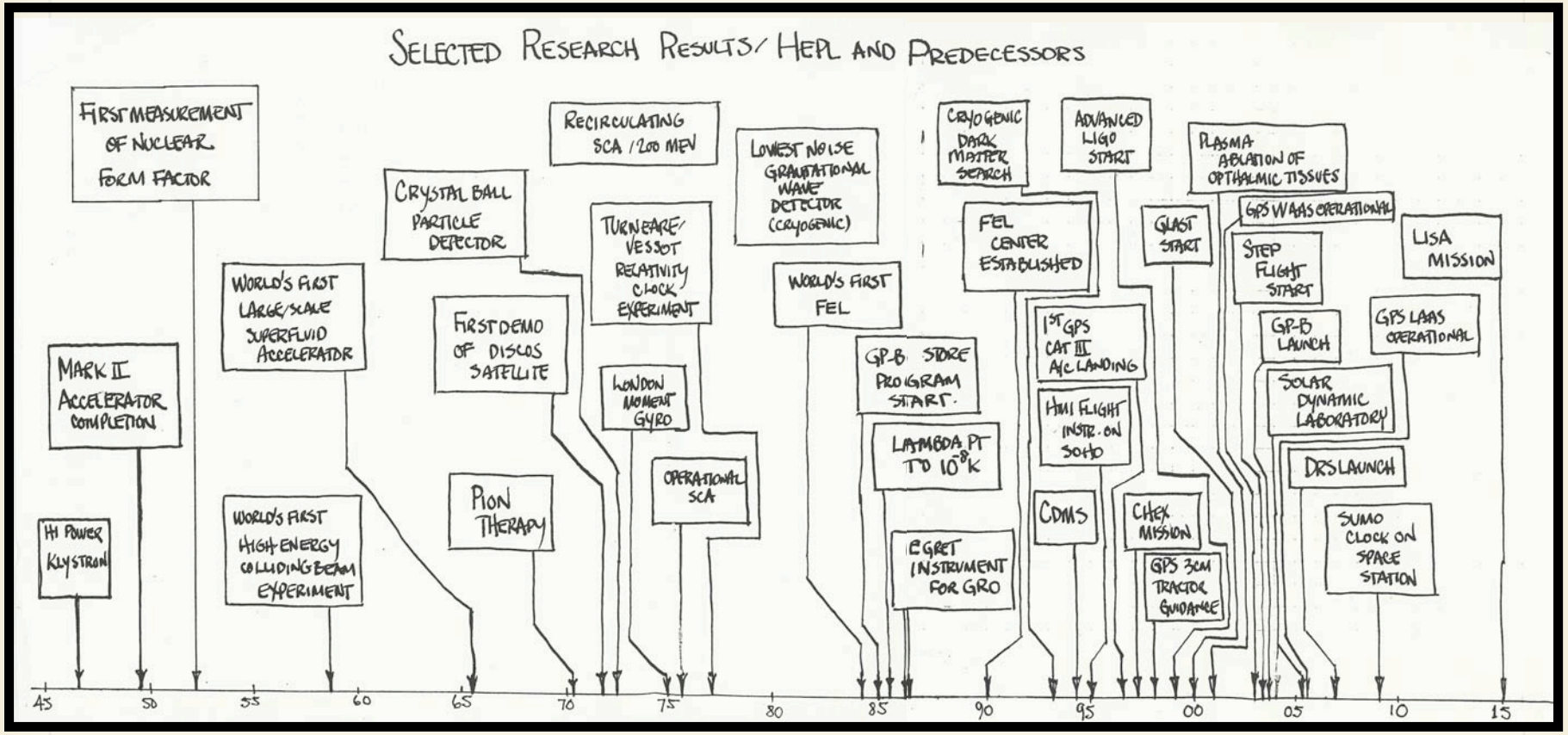
Starting in 1959 Fairbank L. Shiff, R. Canon and in 1962 C. W. F. Everitt started the Gravity Probe B Project to test Einstein's general theory of relativity using a superconducting gyroscope in low earth orbit. Bill Faribank's projects where often beyond the existing technology of the day, but after many years of inventing technology for GP-B, the satellite was successful flown in 2004 and has demonstrated GR in textbook fashion.

In the 1970s Fairbank, A. Schwettman and later T. Smith developed the first superconducing electron accelerator using niobium cavities operated at superfluid helium temperature. The free electron laser was invented by J. Madey in 1978 and demonstrated with the superconducting accelerator in the early 1980s.

In the 1980s Fairbank's work was incorporated with other research projects to form NASA's Microgravity Research Program. In particular, Fairbank and J. Lipa designed the Lambda Point Experiment to exploit the properties of microgravity. The experiment, one of the NASA microgravity program's first fundamental physics experiments, was performed aboard a 1992 flight of the space shuttle.

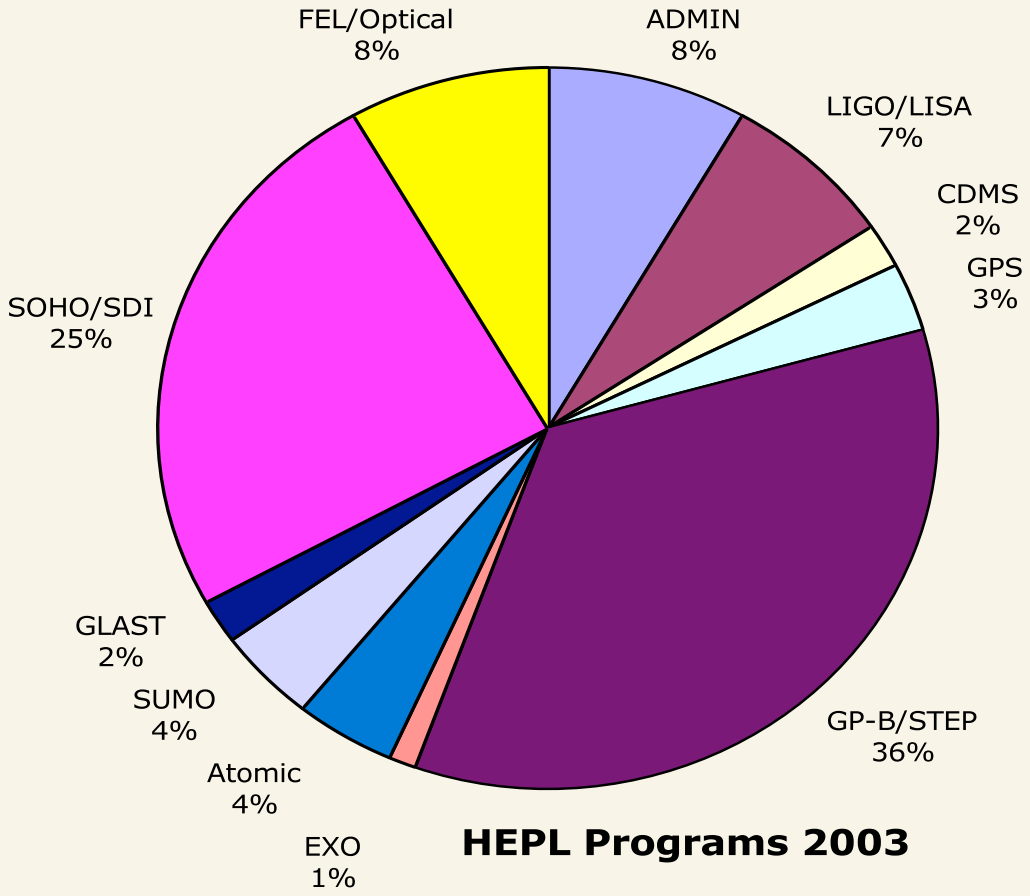
http://www.bookrags.com/biography/william-m-fairbank-wop/

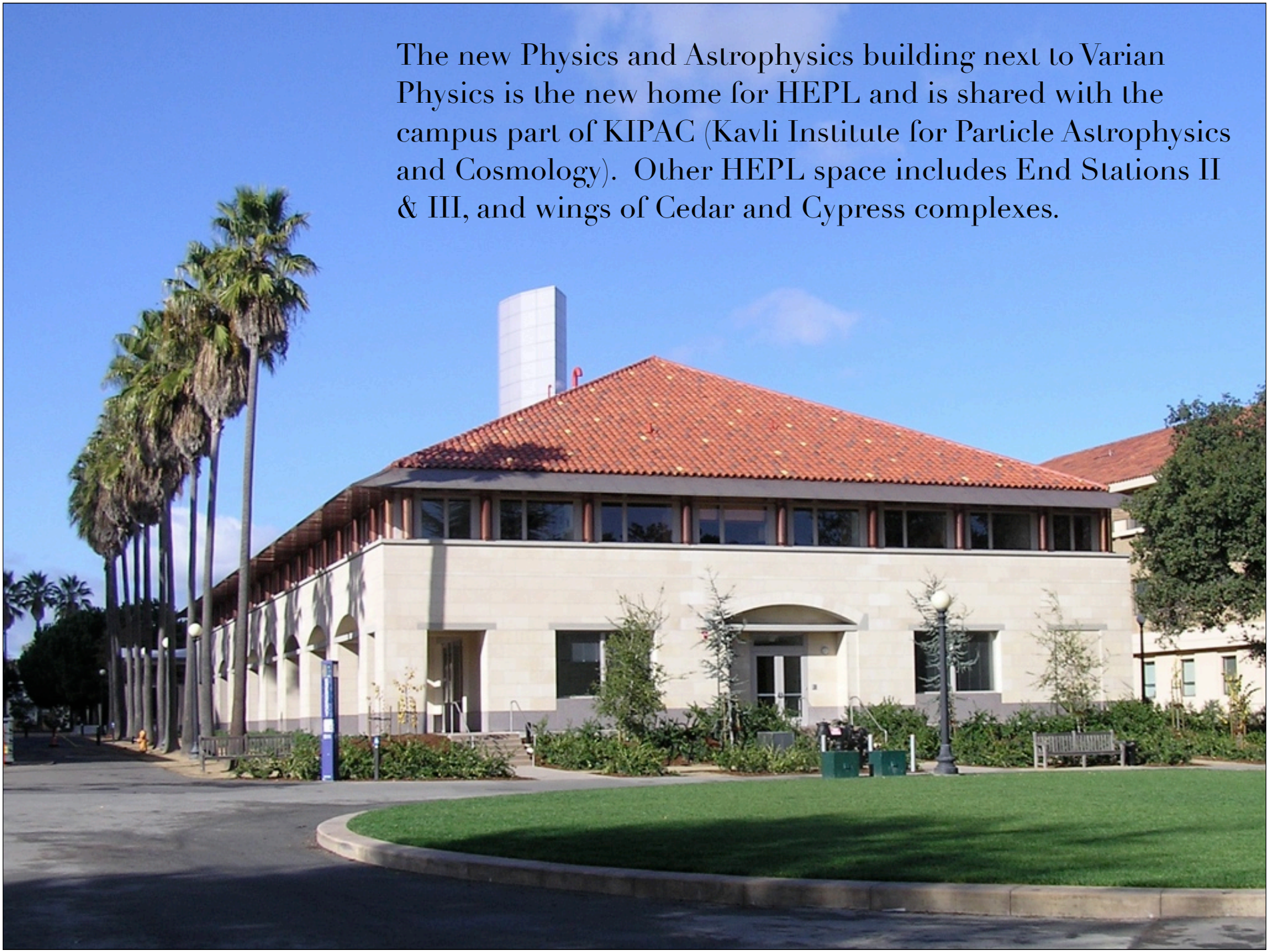
Rich History & Bright Future



by Brad Parkinson

Recent HEPL Programs





The new Physics and Astrophysics building next to Varian Physics is the new home for HEPL and is shared with the campus part of KIPAC (Kavli Institute for Particle Astrophysics and Cosmology). Other HEPL space includes End Stations II & III, and wings of Cedar and Cypress complexes.


The new Science and Engineering Quad underconstruction will house future Stanford technology centers including HEPL